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—BY—

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A MATTER which deeply concerns our steel and iron manufacturers is the securing greater economy in fuel, this being the most effective way to meet any necessity that may arise for increased wages, and lessening English and Scotch competition in the business of supply. The expenditure of fuel in smelting pig iron that formerly took place, running as high as 9 tons per ton, has been reduced to an average of less than 2 tons per ton of pig. In a paper read before the Steel Institute of Great Britain on the subject by Mr. J. S. Deans, he attributes this reduction to a combination of circumstances, the more important of which are the general adoption of the hot blast, the increased temperature of the blast, the adoption of larger furnaces, and the utilization of the waste heat of the furnace. In this country the economy of fuel effected in the smelting process even within the past ten years has not been less than 30 per cent, and further economy is now being attained by heating the blast considerably higher by means of fire-brick stoves. A favoring circumstance has been the increasing use of hematite ores suited to the production of Bessemer steel. It is allowed on all hands that greater economy is yet obtainable. In the manufacture of pig iron the consumption of coke varies as much as 15 to 25 per cent in the same works, and there is a still wider range in different works. The average consumption of coke to a pig of iron in the most improved furnaces may be put at about 18 cents. The statistics of the consumption of fuel in the United States for 1880, as compiled by Mr. Swank, and presented in the census report, show that that year the total consumption of fuel in the production of 3,341,774 tons of pig iron other than charcoal was 2,128,255 tons of coke, and 3,666,935 tons of coal, including both anthracite and bituminous, giving an average of 2.13 tons of coal per ton of pig produced. Where anthracite coal is employed, the consumption of coal has fallen in some works to one one-third of a ton per ton of iron smelted. The economy thus attained is attributed by proprietors of one of these, to higher temperature of blast, as well as better ores and increased make of the lower grades of iron. Details of the working of anthracite furnaces show that the consumption of fuel in these is not so considerable as in furnaces using coke and charcoal. The exact production of American charcoal pig iron in the census of 1880 was 435,018 tons, and the quantity of charcoal used in its manufacture was 53,909,828 bushels, equal to 498,000 tons of charcoal, giving an average consumption of 1·14 ton of charcoal per ton of pig. This country is the world's seat of the charcoal iron industry, for the total annual production of Europe of charcoal iron does not exceed 350,000 tons per annum. In view of the enormous consumption of timber for charcoal, further economy in consumption will be welcomed as contributing to prolong supplies. The best result yet obtained in the consumption of raw coal in furnaces is 35 to 40 cwt. to the ton of pig. We are inclined to believe with Mr. Janes that the greatest economy in the future will be found in the increasing use of fire-brick hot blast stoves. The fuel employed in our Bessemer and open-hearth steel works in 1880 was 781,079 tons, the steel produced being 983,039 tons, so that the average consumption of coal per ton of finished steel was 15·8 cwt. Margins of economy are being secured by the more extensive introduction of fuel-saving appliances. The more complete utilization of the waste heat of the puddling furnace, the adoption, where practicable, of gas puddling, and such a system of firing boilers as will allow of the use of fine dust slack, will prove tributary to greater economy. Nor must we omit to mention improved engines. Mr. Holley showed that such engines would effect a large saving on the cost of the present output of American Bessemer steel.

THE wisdom of the strikes now in force will be judged, as is everything else in which individual action is concerned, by results. This, however, does not preclude a judgment admitting of after modification. One characteristic of the present strikes is the feeling of misgiving everywhere prevailing among the strikers as to whether the movement was well timed, and the absence of any general dissatisfaction as to the wages previously received. The movement is weakened by a prevalent opinion that the area over which these strikes extend is too wide for assuring effective action, and uncertainty as to the means of the Association to sustain financially prolonged strikes on the present scale. That there is little display of a spirit of enthusiastic confidence, which, based on an illusion or not, is so inspiriting in a time of trial, is another weakening element. A point promotive of dissatisfaction is that the men in the finishing departments get no increase of wages even if the strikes succeed, demands on their account having been withdrawn, with slight modifications as to the sheet mill rollers—(this being only on the scale where 30 is reached, with an advance of 10 to 20 per cent on certain guages)—so that they are called on to make a present sacrifice for puddlers, muck rollers and scrappers on sand bottom. The engineers will get nothing. The strikes occur when the iron business is more depressed than for a long period; when railroad companies—those great absorbers of iron, were retrenching outlay on permanent way and equipment; when iron manufacturers as a body, could not be said to be driven with orders, or had contracts which would not permit of postponement. One motive probably that influenced the decree for thus widening the area of the strikes, was to check as far as possible the transfer of contracts, and so neutralizing means that have been resorted to by manufacturers to avert loss, and lessen the force of strikes as affecting their interests. The situation in Cincinnati is peculiar. There is an understood agreement between the Amalgamated Association and the iron manufacturers as to the time during which the previously adopted scale should run, has been set aside. At the conference held a year ago between committees of the Manufacturers' Association and Amalgamated Association, Mr. Jarrett urged as a reason for the advances then demanded that it would prevent further demands being made, obviating all causes of complaint, and his committee endorsed the views thus expressed. The latter now plead that this was simply their individual opinion, and should not have been regarded as official. Lastly we have to note as a feature of the strikes, divided counsels. At the meeting of Union delegates which preceded the strikes, President Jarrett urged that the wiser course to pursue was to withdraw all demands for an advance until the wages of Eastern and Western workers became better equalized, and others followed in the same strain, predicting that defeat could be the only result; but those delegates who had received instructions from their constituents to vote for the restoration of the original scales were largely in the majority, and of course carried the day. We believe that his counsels might well have been followed. That labor should have its due reward is to the interests of the country, and public sentiment is opposed to that oppressiveness which would withhold it, but manifestly no case has been made out showing that the present condition of the iron trade will justify an advance of wages. The strikes, if prolonged, will bridge over a period of dullness and improve market prices for raw and finished iron, but no advance in wages will compensate the strikers for any long period of inaction.

THE present period will be marked in the industrial history of the country as the culminating point of the great contest between capital and labor. At no time was there greater unification of labor interests, and consequently at no time were the working classes better equipped for carrying out the behests of those they elect as their leaders. The times have gone by when the supply of labor was too large for strikes to have any reasonable success. Combination has been at work, not only to establish centres of united action for each branch of industry, but in connecting the radii of these centres with others of a kindred character. The power of numbers thus asserts itself, and becomes one of the great factors in determining successive issues whenever raised. Strikes have for their aim the securing a larger share of the profits of capital, and as the conditions of manufacture are ever subject to variation as respects material and market value—both ruled by extent of supply and demand—no scale of wages can be permanent. Just as no one doubts the right of a capitalist to employ his means as he pleases, so no one can reasonably question the right of the laborer and mechanic to judge the scale of adequate remuneration and to seek by all lawful means to obtain it. The Union combinations are legitimate coercive instruments for satisfactory adjustment of wages, and err only when resorting to violence attributable to restlessness under a passive position and impatience of results. In the iron trade skirmishing is over, and a general engagement is brought on. In the end, self interest will probably govern. There are points in which those interests both for capital and labor are identical, and the more complete understanding that prevails of their true relations, constitutes a guarantee of a satisfactory settlement in the end.

CLEVELAND has the prospect of securing by a direct line a new ocean outlet, that of Newport News, which by force of improved railway organizations and extensions of existing lines is destined to be a leading Atlantic port for trade with foreign countries. We are indebted to our contemporary, the *Cleveland Herald*, for the development of the plan of the Ohio Central extension, which is to afford us that outlet, and which was obtained from one of the parties interested. The Ohio Central will be extended from Corning, Perry county, this State, to Charleston, W. Va. For this extension the right of way has been entirely secured, the

grading is nearly completed, and the company is now devoting its attention to track laying and bridge building. After leaving Corning the extended line first strikes the Ohio river at Pomeroy; then follows the river to Point Pleasant. Crossing this river, it follows the Kanawha river on to Charleston, the future capital of West Virginia, where it forms a connection with the Chesapeake & Ohio, and by that means an outlet to the sea at Newport News. It is expected that during next fall—certainly by the end of the year—this extension will be entirely completed, with, perhaps, the exception of the bridge at Point Pleasant, which will be an extensive and tedious piece of work. With these extensions completed, and the entire line in operation from Toledo, traversing and owning some of the best coal land in tne country, and reaching the lake, the river and tide-water, the Ohio Central must prove a valuable North and South road.

WE have received a pamphlet from the Treasury Department exhibiting the comparative rates of wages in the United States and foreign countries, being a report in reply to a Senate resolution of December 21, 1881, by Joseph Nimmo, Chief of Bureau Bureau of Statistics. It embodies the census statement of Mr. James Swank as to wages of puddling in this country and England. "At Pittsburgh the price of puddling, or boiler, iron was fixed for one year on the 30th of May, 1881, in an agreement between the employers and their workmen, at a minimum of $5.50 per ton, the price to be advanced if the price of bar iron should advance beyond 2¼ cents a pound. Of the $5.50 the puddler's helper received about one-third. At Philadelphia, in an agreement between the employers and their workmen, on the 24th of July, 1880, the minimum price of puddling was fixed for an indefinite period, which still continues at $4 per ton, of which sum the helper receives about one-third. When the price of bar iron is 2¼ cents a pound the price of puddling is to be $4.50 per ton, the helper to receive about one-third. If the price of bar-iron advances beyond 2½ cents a pound the price of puddling is to be advanced. The Pittsburgh schedule of wages for puddling prevails in the western parts of the United States, and the Philadelphia schedule is fairly representative of the wages paid in Eastern rolling-mills. In England the wages of iron and steel workers are probably higher than in any other part of Europe. The north of England is the principal seat of the iron industry of that country. A board of arbitration and conciliation for the manufactured-iron trade of the north of England adjusts the wages of all rolling mill workmen in the district every three months, upon the basis of the average net selling price of rolled iron during the three months preceding the month in which the board meets. The average net selling price of rolled iron for the three months which ended on the 20th of June (a period of prosperity and good prices) was £62s. 2. ($30.54), and the wages of puddlers for the three months beginning on the 1st of August was officially declared to be 7s. per ton, or about $1.75, of which sum the puddler's helper, in accordance with the English custom, receives about one-third." Mr. Edward Atkinson, the eminent cotton manufacturer and statistician, in calling attention to the differing conditions of localities and countries as to manufactures, observes that "any one who attempts to gauge the cost of production by comparison of wages, will most likely be misled; and if it is assumed that the lowest cost of production will be found where the wages are lowest, he will be sure to be misled, as that rule would lead to the expectation of finding the lowest cost of cotton fabrics in the factories of India; next in the factories of Germany; next, perhaps of France, and last, perhaps of England." He adds that so far as the rate of wages constitutes in part a standard of cost, it is tolerably safe to take the highest wages as the standard of lowest cost. Other contributors to this pamphlet confirm his views.

WE stated in last week's issue that the Standard Coal and Iron Company, the operations of which have in view the Hocking Valley and its outlets, would from the 1st inst act in its own corporate character instead of by intermediaries, in acquiring and closing options. Accordingly prominent members of the company have been in Cleveland the past week for the purpose of closing up options, paying for the property purchased, and opening formally their business. They have made a trip to the Hocking Valley.

THE recent increase in ocean telegraph rates has resulted in the formation of an English company which intends to lay two new cables between England and the United States with as little delay as possible. There has been subscribed in London $3,000,000 towards the capital stock of the new company. A provisional board has been formed and two of the directors of the Bank of England, as well as some of the first merchants of London, are members of it. An arrangement has been made to operate the new cables in connection with the Baltimore and Ohio Telegraph Company. It is said that the cables are to be operated upon the cooperative principle, and that all stockholders will be entitled to a rebate on their business in proportion to their holding in the stock of the company. The tariff to the public will be 24 cents a word. By means of the Baltimore and Ohio Telegraph Company's wires the new cables will have an entry to Boston, New York, Philadelphia, Chicago and other centres of commerce. It is estimated that the two cables will cost $9,000,000.

MANUFACTURES.

TO MACHINISTS. MANUFACTURERS AND OTHERS.

THE publishers of THE TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinist and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised befer sendin to press.

OHIO INDUSTRIES.

THREE Whitwell ovens are to be put up at Belfont furnace.

THE iron and steel mill, Ironton, shipped last week 212 tons of iron to St. Louis.

THE Lawrence iron works turned out in April last 1047 tons of manufactured iron.

M. DEAL & Co., Bucyrus, are selling a large quantity of their California Smutters.

THE new "roller process" has been introduced into F. Schumaker's Cascade mills at Akron.

THE Ohio Falls Car Works have closed down for lack of work. Six hundred men out of employment.

THE Forsyth Scale Works, Youngstown, are running in all departments, with the exception of the foundry.

SOHN & REUTSCHLEN, Hamilton, are turning out a superb quality of gray castings, remarkabie also for smoothness of finish.

TAPLIN, Rice & Co., Akron, who employ 150 hands, have purchased the Sieberling Machine Works, which are now in running order.

THE Youngstown stove works are producing between 500 and 600 cock stoves a month. All departments are on full time, and no difficulty has been found in securing all the orders they can fill.

THE Alice Furnace, Ironton, is making forty-five tons daily.

P. P. BUSH, of Canton, employs 30 hands at the Novelty Iron Works. He is building a 250-horse power engine for the Bolton Steel Works.

THE Turn Buckle Co. of Cleveland has been incorporated with a capital of $250,000; also the Central Barge Co. of Toledo with a capital of $200,000.

A. J. BOYCE, East Liverpool, has his new machine shops running night and day on fine pottery machinery, of which he makes a specialty.

THE other week the Girard furnace, Youngstown, turned out 505 tons of No. 1 iron, being the largest amount she has produced in any one week since built.

MR. F. L. CLARK, of Pittsburgh, has purchased an interest in a mill at Newburg. The firm will be Atkins & Clark, and will manufacture bolt, chain and carriage iron.

THE Tip Paper Co., Tippecanoe City, is having built for its use the largest paper machine in the West; it is a double cylinder, 72-inch machine, with nineteen dryers.

THE Lima Mill Furnishing Co., formerly the Keller Purifier Co., Lima, is doing an increasing business in putting in machinery in flour mills in this and other States.

THE Toledo Spring and Variety Works have just added a thirty horse power boiler and engine, lathe, trip hammer and drill to their facilities, in anticipation of a busy season.

MR. W. H. Carter's Akron Cutlery Works are prospering nicely. His trade extends principally to the southern part of Ohio, lying along the Ohio River, and is constantly increasing.

THE Youngstown Stove Co. is having a good trade, the demand for their products showing no signs of a decrease. They are employing their full quota of men in all departments.

THE works of Mr. H. Deuscher, Hamilton, are working to their full capacity in the manufacture of "Dasher" plows, of chilled steel, "Barbour" corn drill, the "Victor" churn, school furniture, castings, agricultural tools and shelf hardware.

THE season's requirements for the garden tools and implements of the Hughes & Males Agricultural Co., Hamilton, are exceedingly heavy. They are turning out a good number of cider mills, riding saws and various hardware specialties.

THE Cuyahoga Works have under way a large compound steam engine for one of the largest grain elevators in Chicago. This will be the first engine of the kind used for this purpose. The steam cylinders will be 30 and 56 inches bore, and 48 inches stroke.

MESSRS. Deinzer & Stephen, Hamilton, manufacture hubs, spokes, and bent material for wagons and buggies. They are an enterprising firm, and do an annual business, which returns them for labor and material fully $250,000.

THE shops of John A. Thomas & Sons, Springfield, are building three 1-horse power stationary engines for Cincinnati firms. These shops have a world-wide reputation for doing the best work on their portable engines. M. Eugene Tyler is superintendent of machinery.

MR. CHARLES STRIEBEL, manufacturer of carriages and wagons, 93 Woodland Ave., Cleveland, has been established six years, and employs 13 hands. Trade has been very good, and prospects are encouraging. Mr. Striebel undertakes general blacksmithing.

MESSRS. SHULER & BENNINGHOFEN, the proprietors of the Hamilton Woolen Mills, make a specialty of press felts and fourdrinier felts, as well as all grades of course and fine felts for various uses. Their product is large, showing a value of more than $160,000 annually, with a constantly accelerating demand.

THE Ohio Central shops at Bucyrus have just turned out a new locomotive, the first of five they are building; they are eight-wheel or American engines, with 17x24-in. cylinders, driving wheels 61 in. in diameter, the steel tires being 3 in. thick; they have 166 wrought-iron tubes, 2 in. outside diameter, No. 12 wire gauge; boiler, fire-box, cross-heads, axles, piston-rods, crank-pins and rocker-shafts all of steel.

THE Brush Electric Light Company is having hydraulic machinery manufactured to work under a pressure of 5,000 pounds to the square inch.

THE orders for saw mills and portrble engines that continue to flow into the Hooven, Owens & Rentschler Company, Hamilton, successors to one of the oldest and most widely-known manufacturing houses in Ohio, that of Owens, Lane, Dyer & Co., keep the works busy. The company has manufactured a road engine of improved construction.

The Queen City Forging Co., Cincinnati, have within the past six months supplied their works with a number of improved tools, among which are several milling machines made by the Pratt & Whitney Co.; two 13-ton hammers are now in operation, and preparations are being made for more of the same size, and for a Bradley hammer of large dimensions. The specialties of these works are fifth wheels, carriage king bolts, shaft couplings, axle clips, and other carriage hardware.

THE Packham Crimper Co., Mechanicsburg, have moved into a new shop, and already find the capacity inadequate to supply the increasing orders for tinmen's tools, especially the Packham pipe crimping machine. They have put in a No. 3 Brainard universal milling machine, with automatic spiral attachment, besides a number of special tools made on the premises. They are now getting out some new tinman's tools, and are making arrangements to build a light shear and punch.

EAST LIVERPOOL has 10 potteries with 14 kilns making white or granite ware; 10 potteries with 25 kilns making mahogany-colored or Rockingham ware; 3 with 10 kilns making cream-colored ware, and with two kilns making nothing but door-knobs—a total of 25 potters and 83 kilns, not taking into account 10 or 15 kilns for decorated ware. The white and yellow ware potteries turn out annually about 32,000,000 pieces, while the product of the door knob concern is 160,000 per week.

THE Miller Company, Canton, have recently closed contracts with several large engine-building concerns, who have adopted and will use the Torrent and Unique steam pumps on all their agricultural and sawing engines. They have also just furnished the Sibley College of Mechanic Arts of the Cornell University one of their new and improved Unique pumps for illustration, experiment and instructing the students of that institution. On account of the increased demand for the different sizes of these pumps the company contemplate erecting some extensive additions to their works, the plans for the same being now in the hands of the architects.

OUR Niles correspondent writes: Reeves Brothers, manufacturers of all kinds of portable and stationary steam boilers, blast furnace stacks and sheet iron work, report trade good. The execution of orders on hand will keep their extensive works busy for at least two months. The business of this flourishing firm was established in 1874. One hundred hands are in constant employ at the works. Shipments are made principally to the Western country and the oil territories of Pennsylvania.——The Globe Foundry and Machine Works of Mr. John Carter, where the manufacture of iron and brass castings, engines, pumps, etc. is carried on, employs 46 hands. Trade is reported good and prospects for the coming season excellent.

THE machine shops of J. M. Robinson & Co., Cincinnati, have in the last year been increased more than double in working space, and large additions to the working machinery have been made. Besides cornice brakes and other sheet metal workers' tools, this firm have become largely engaged in the manufacture of steel dies of various kinds, and in the cutting, punching, stamping, forming and embossing of sheet-metal tags of sizes and designs suitable for all purposes. They are at this time filling some very large orders for goods of this kind, and for finely engraved steel plates and dies, hand and power punching machines, &c. Within the past two years the demand in the West for sheet metal workers' tools has grown to immense proportions, and the establishment of J. M. Robinson & Co has been driven to its utmost capacity to keep up with orders.

HOFER BROS., Moundsville and Powhattan, have ordered machinery for a large combined stone and roller mill of Nordyke & Marmon Co., of Indianapolis, Ind., which will be erected at Powhattan —— Messrs. Bowers & Delancy, Bucyrus, have had their mill repaired and placed in it one of the pneumatic purifiers, made by W. & N. Thayer & Co. of Westerville, O.——Messrs. Dirks & Co., Marietta, are remodelling their mill, putting in the Little Giant reducers, rolls and purifiers, which are furnished by the Case Manufacturing Co., Columbus.——The "Poland Mill," Poland, owned by Messrs. Marshall & Justus, is being remodelled; a Smith purifier and a run of middlings burrs, furnished by the G. R. Gale Manufacturing Co., Cleveland, are being put in.——The "City Mills," Zanesville, which have lately been changed to the gradual reduction system, are operated by Messrs. Applegate & Stults. They now have a capacity of 200 barrels per day. The motive power is furnished by a fine 100-horse power engine——Mr. R. Wilkins & Co., Newark, manufacturers of the Improved Ohio middlings purifier, have lately made improvements in their machine by using a double pitman and double case, so that the machine needs no bracing.—*Amer. Miller.*

THE American Vapor Stove Co., 6 Champlain street, corner of Valley Railway Depot, Cleveland, has laid itself out for a large season's business in the manufacture of their front rank double top stove or range, patented December 13th, 1881. In addition to other improvements, this stove (illustrated elsewhere in our columns) has a double detachable shelf. The burners are so arranged between the upper and lower plates as to be thoroughly protected from any current of air, and the heat which is wasted in other stoves is utilized in heating the top and shelf. The convenience and economy derived from this in heating and keeping food hot after being prepared for the table can readily be seen, and thus the great deficiency acknowledged in all other vapor stoves is fully supplied. The reservoir is of galvanized iron, and the concave top prevents overflowing, thus assuring its safety. The reservoir and heater are of great practical value. The heater, which is patented, is a hollow, cast-iron ring which surrounds the burner, beneath the grate, and is connected to the reservoir with two pipes, thus heating water readily with no additional cost of fuel, and without interfering with the other uses of the burner.

MAINE.

THE Adams Manufacturing Company has been organized at Portland for manufacturing boot and shoe machinery, tools, &c., with a capital of $350,000.

MASSACHUSETTS.

THE Reynolds Plow Company, of Brockton, has been incorporated, with a capital of $25,000, for the manufacture and sale of agricultural tools and implements.

AT Pittsfield, the tack company is running forty-two machines and making thirty tons of tacks, brads, &c., a month. Andrew Schouler, lately of the American mills, at Rockville, Ct., is the new superintendent at Tilotson & Power's mill.

THE Cordage Factory, Boston, is running full handed and producing about 12 tons of assorted rope daily, and the company have now under consideration plans for making improvements, which, when completed, will give them a capacity double their present one. All descriptions of cordage and rope, both manila and sisal, are manufactured by this company. Their trade is largely in New England, especially along the Maine seacoast and in the cotton mills, for which bale rope is sold.

THE New Home Sewing Machine Co.'s foundry, Boston, is producing 18 tons of castings per day, to enable them to not only supply the machine shop department with castings, but also to supply the other machine shops in the town with heavy castings for turbine water wheels, saw mills, and woolen machinery in general.

CONNECTICUT.

THE Billings & Spencer Co., Hartford, have increased their motive power by the addition of a Beach water front boiler of 100 horse-power. Business is very lively with them in all departments. They have orders on hand from England and Canada for 20,000 sewing machine shuttles. They have capacity in this department for 35,000 shuttles per month, of which the Gold Medal Sewing Machine Company consume 12,000, and the White, of Cleveland, Ohio, 10,000 per month. They also use from 18 to 20 tons of bar iron and steel per month for the manufacture of drop forgings for their own tools, and tools for other manufacturers. They are running at present twenty-four drop hammers.

I. B. DAVIS & SON, Hartford, lately shipped a heater and pump—the largest they make—for heating 1200 horse-power boilers to the Para Rubber Shoe Company.

THE Coulter & McKenzie Machine Co., Bridgeport, makers of machinery for the manufacture of car and carriage springs, are now filling large orders from parties in Ohio who are about to embark in the manufacture of springs. The same firm also make carriage axle machines. They employ about 90 hands.

THE E. Horton & Son Company, Windsor Locks, have completed, and will shortly put on the market a new universal combination chuck, which, it is thought, will excel any yet made. This company have within the past year made extensive additions to their works, adding a new blacksmith shop and machine room, also a large number of new and improved tools, by which their producing capacity is about doubled. They have recently invented, and are having several made for their own use, an automatic gear cutting machine, which is an exceedingly complete and ingenious machine. They have had it patented, and will only allow it to be made and used in their own shops.

RHODE ISLAND.

THE Pawtucket Mfg. Co., for the manufacture of bolts, nuts and machinery, have broken ground for their new buildings. The main building is 153x120 feet, divided into four departments—the machine shop, 80x20 feet; the forging room, 150x40 feet; the nut and cutting department, 112x40 feet; and the rattling and polishing room occupying the building in the court. The works are driven by an eighty-five horse-power engine, and will start in about two weeks.

PENNSYLVANIA.

THE census report of manufactures of the cities gives the following statistics for Philadelphia: Number of establishments, 8,337; capital, $170,495,191; average number of hands employed, 173,862; total amount paid in wages during the year, $60,606,287; value of materials consumed, $187,169,375; value of products, $304,591,725. Among other concerns, there are 157 engaged in the manufacture of cotton goods, employing 12,274 hands; in 8 glass works 2,238 hands are employed; 187 machine shops, employing 7,603 men; 93 hosiery and knit goods factories, employing 7,804 hands; 97 establishments engaged in the manufacture of iron and steel of different descriptions, employing 7,518 men: 272 tin, copper and sheet iron works, employing 2,211 men; 89 woolen goods factories, having a capital of $11,752,900, and employing 11,244 hands; 25 worsted goods factories, employing 4,256 hands. The classified list of mechanical and manufacturing establishments in Philadelyhia contains 196 different industries.

H. K. PORTER & Co., Pittsburgh, lately shipped two narrow gauge locomotives to Japan, and have orders for Cuba and South America; also one for Arizona of only 20 inches guage track.

THE Company starting the new nut and bolt works at Lebanon will eventually erect three or four rolling mills.

THE Pennsylvania Graphite Company, controlled by Reading capitalists, who own the bulk of the stock, are making important improvements to their works at Byers, on the Pickering Valley Railroad. New machinery is being put in for the manufacture of additional grades of graphite, three grades, all for lubricating purposes, having recently been added to the list.

THERE were 1650 cars built at the Reading Car shops last year.

ONE-HALF of the capital required to build a new stove works at Spring City, Montgomery Co., has been subscribed.

A SHEET-IRON rolling mill company, with a paid-up capital of $64,000, has been formed at Canonsburg, Washington Co.

THE Columbia Stove Company has been chartered, with a capital of $200,000. The shareholders are nearly all residents of Columbia, Lancaster County.

INDIANA.

THE American Foundry Company, New Albany, have just completed two double polishers for the plate glass works of that city, weighing fifty tons each.

ILLINOIS.

THE Harrison Wire Company, of St. Louis, contemplate the erection of large steel works at Harrison, under the style of the Harrison Steel Co., and, according to current reports, large amounts of Eastern capital have been invested in the project. The company is said to have already nearly completed the drafts of its plans, which will include twelve blast furnaces, so arranged that each may be operated independently of any other. From these furnaces the raw iron will be carried in a molten state to the converting department, in which it will be formed into ingots of the desired size and shape. The work of preparing the material for blooms, wire rods, eye-bars, boiler plate, &c., will be done in another department, which will constitute the special feature of the works. The adoption of the basic process will permit the successful utilization of the highly phosphoric ores so abundant in the districts about the headwaters of the Tennessee and Cumberland rivers.

THE Aurora Steam Engine Works, Colby Bros. & Co., proprietors, is the name of a new concern just established at Aurora for the manufacture and repairing of steam engines, boilers and general machinery. This company are placing in their establishment some new machinery, and have now orders on hand for a large amount of work. Their works cover an acre and a half of ground.

THE Calumet Iron and Steel Works, Chicago, are now employing the largest force which they have ever used. Nine hundred names are on their pay roll. They are working full and double turn. Their output of nails is about 22,000 kegs a month, of bars 1800 tons, and of pig iron 3500 tons a month.

THE Gates & Scoville Iron Works, Chicago, are building a rock breaker, having a capacity of from 300 to 400 tons a day, for the United States Government, to be used at Mare Island, California.

MISSOURI.

THE French Window Glass Company, of Missouri, are running eight pots, work fifty men, and use from 12 to 15 tons of sand per week. The annual production of glass is 30,000 boxes of 50 feet each, and the wages paid employes amounts to $55,000 per year.

THE Kingsland & Ferguson Manufacturing Company, St. Louis, have received an order from Mexico for two threshing machines.

HELLER & HOFFMAN, chair manufacturers, St. Louis, have added a complete saw mill, two boring machines, a sand-paper machine costing $500, and other machinery to their works. The capacity of the works is now about 600 dozen chairs per week.

THE Missouri Malleable Iron Company, St. Louis, recently organized, will commence the erection of their shops and buildings in about five weeks.

YOUNGSTOWN INDUSTRIES.

[FROM OUR SPECIAL CORRESPONDENT].

YOUNGSTOWN, June 8.

The Youngstown Malleable Iron Company, manufacturers of refined malleable iron castings, and among whose specialties are Lambert's malleable iron felloes, and the irons for Oviatt's Common Sense wagon seat riser and lock, has been materially strengthened by the accession to its executive of Mr. A. N. Bragg, of the firm of A. N. Bragg & Co., who formerly carried on the malleable iron business at Pine Meadow, Conn. Mr. Bragg brings with him the whole interest of that firm, and places the same at the service of this company, thus doubling the stock. The company propose erecting a large addition to their foundry, size 70x150; they also propose building several smaller buildings during the coming year. These new erections will treble the capacity of the works, and place them in splendid condition for the prompt filling of contracts for all kinds of malleable castings, both cupola and air furnace castings. The directors of this company are: Henry Tod, President; Paul Wick, Vice President; A. N. Bragg, secretary and treasurer; Frank Demming, superintendent. A large and rapid development of the business of this company is assured, its reputation for unsurpassed work in its special line having been fully established. The company employs 125 men. ——The Arms, Bell & Co., manufacturers of nuts, washers, bolts, &c., who were established in 1864, have orders ahead to keep them going about a month. They did a good trade the past season, but the general condition of business is such that they are not sanguine as to immediate prospects. ——The Youngstown Carriage and Wagon Co., corner Boardman and Hazel streets, manufacturers of carriages, wagons, and vehicles of every description, employ 100 hands. The company was established 15 years since, and is known for good material and workmanship and desirable styles. The weather has rendered trade somewhat slack. A great deal of repairing is always going on at the works. The capital stock of the company, all paid up, is $60,000. Mr. W. J. Hitchcock, President; Mr. G. Lemly, Vice President; Mr. H. Siegfried, Treasurer, and Mr. J. H. Thompson, Secretary.—— A remarkable invention by Dr. N. B. Acheson is called the "phonotelegraph," and is free from the defects of telephone and phonograph apparatus, which are by no means perfect in reproduction of tone; enabling also conversation to be carried on between very distant points—for instance, between New York and San Francisco. By its aid, too, several messages can be sent over the same wire at once. The principle is not only to be a telephone on an entirely new theory, but also a phonographic register, also on a new theory. This register will be automatically made while the conversation is being carried on. The *Youngstown Register* has obtained the following explanation from the inventor; "It is expected to take the place of the telephone, and the phonograph. Skilled operators will not be required in order to send messages. A person in New York, another in San Francisco, another in Augusta, Me., one in New Orleans, and another in Chicago, all wishing to engage in a conversation on any topic, will be able, by means of instruments in their respective rooms, connecting with the central office in each place—the different places being connected by wire, to carry on a conversation of any length with perfect ease. While his conversation is being carried on there will be automatically made in each place a register, and in fact in as many places on the line as is desired, of all that is said. At any time desired each and all of the persons who have been in the conversation may use their registers to produce the original conversation. This reproduction will be perfectly accurate, giving the tones of their voices, modifications, etc. The register is durable and not easily destroyed. Upon one of these registers may be put as much matter as is contained in a copy of the *News-Register*, and by means of a simple contrivance, which a person may carry in his pocket and is not larger than an ordinary watch, he can reproduce this reading matter in any volume or tone he desires. By means of this contrivance the speed of the delivery may be either accelerated or retarded. Why, a person may carry a May musical festival around in his pocket, reproducing the music whenever and wherever he chooses and in any volume. One thousand of these registers can be made as easily and as cheaply as one. It will be specially valuable for court rooms to take the place of the stenographer, it being a register more lasting than ink." The invention is backed by capitalists of Mineral Ridge and Niles.

COUNTING THE STROKES OF A STEAM HAMMER.—Some years ago, Mr. Coleman Sellers, of Philadelphia, noted the difficulty of counting the blows of of a quickly-striking steam hammer when the strokes were near 300 per minute, a very wide discrepancy always occurring between the figures of those who attempted to count them, the tendency being to over-count rather than under-count. He found that three careful observers, counting the blows at the same time, made a variation of from 275 to 235 in the same count. This wide discrepancy caused him to devise the following simple and ingenious method of making an accurate and automatic register of the strokes. He connected a recording telegraph instrument to the machine, placing two keys in the circuit. One key was closed by each blow of the hammer; and by keeping the hand key closed for a definite time, say one or two minutes, a row of dots, representing the number of blows made in that time, were recorded, which dots could be counted afterwards at leisure. Many experiments have been tried with this apparatus attached, and it has been found that very seldom the count of any observer tallies with the count of the instrument, the rule being, as above stated, that the observer almost invariably overcounts.

Story of a Great Monopoly.

[FROM THE ATLANTIC MONTHLY.]

[Continued.]

The officers of the Standard Oil Company refused to testify relative to its operations before the Supreme Court of Pennsylvania, the late New York Investigating Committee, and a committee of Congress. The New York committee found there was nothing to be learned from them, and was compelled to confess its inability to ascertain as much as it desired to know "of this mysterious organization, whose business and transactions are of such a character that its members declined giving a history or description, lest their testimony be used to convict them of crime."

Their great business capacity would have insured the managers of the Standard success, but the means by which they achieved monopoly was by conspiracy with the railroads. Mr. Simon Sterne, counsel for the merchants in New York in the New York investigation, declared that the relations of the railroads to the Standard exhibited "the most shameless perversion of the duties of a common carrier to private ends that has taken place in the history of the world." The Standard killed its rivals, in brief, by getting the great trunk lines to refuse to give them transportation. Commodore Vanderbilt is reported to have said that there was but one man—Rockefeller—who could dictate to him. Whether or not Vanderbilt said it, Rockefeller did it. The Standard has done everything with the Pennsylvania legislature, except refine it. In 1876 its organization was brought before Congress, and referred to a committee. A prominent member of the Standard, not a member of Congress, conducted the farce of inquiry from behind the seat of the chairman. Another member of the company, who was a member of Congress, came with the financial officer of the company before the committee, and sustained him in his refusal to testify about the organization, its members, or its relations with the railroads. The committee never reported. The facts they suppressed must be hunted out through newspaper articles, memorials from the oil producers and refiners, records of lawsuits, reports of chambers of commerce and of legislative investigating committees, and other miscellaneous sources of information.

The contract is in print by which the Pennsylvania Railroad agreed with the Standard, under the name of the South Improvement Company, to double the freights on oil to everybody, but to repay the Standard one dollar for every barrel of oil it shipped, and one dollar for every barrel any of its competitors shipped. This contract was produced in Congress, and was stigmatized by Representative Conger as "the most damnable and startling evidence yet produced of the possibility of railroad monopoly." Ostensibly this contract was given up, in deference to the whirlwind of indignation it excited. But Rockefeller, the manager of the Standard, was a man who can learn from defeat. He made no more tell-tale contracts that could be printed. He effected secret arrangements with the Pennsylvania, the New York Central, the Erie, and the Atlantic and Great Western. What influences he used to make the railroad managers pliable may probably be guessed from the fact that one-quarter of the stock of the Acme Oil Company, a partner in the Standard combination, on which heavy monthly dividends are paid, is owned by persons whose names Rockefeller would never reveal, which Mr. Archbold, the president of the company, said under oath he had not been told, and which the Supreme Court of Pennsylvania has not yet been able to find out. The Standard succeeded in getting from Mr. Vanderbilt free transportation for its crude oil from the wells in Pennsylvania, one hundred and fifty miles, to the refineries at Cleveland, and back. This stamped out competing refineries at Pittsburg, and created much of the raw material of the riots of July, 1887.

[*To be continued.*]

THE Pennsylvania Railroad Company has given orders that all the baggage cars on that road shall have traps built in the roofs with adjustable glass doors. The idea of this is that the baggage master and his assistants may have an opportunity for escape in the event of accident and the closing of all the means of egress which are now in use. The company is considering patents of this kind which may be applied to passenger cars.

MECHANICAL RECEIPTS AND ITEMS

Forms of Cutting Tools.

Probably in no particular is there a greater deviation in the proper form of cutting tools than in that of their clearance. There seems to be a lack of reason in the form of cutting tools in the machine shop where so much latitude is given to the shaping of tools. The carpenter and joiner accepts his chisels and planes from the manufacturer, and never thinks of doubting their adaptability; but the machinist uses his own fancy and can get any tool he wants by going to the forger. There is plenty of material, plenty of the employer's time, plenty of chaff to exchange over the slow-heating fire and the convenient anvil; and then the tool is so forged that when the edge goes there is very little grinding to do to bring another edge. A razor-like edge and a pocket knife angle seem to be the fancy of some easy going mechanics. It may be pleasant for them to spend time dallying over the forge fire, but the proprietor or the company suffers. And the tools suffer. There is no sense in giving a knife edge to a shearing blade; in putting a cutting edge on a punch, or in giving a wood-cutting curve to a milling machine tool. And yet the inexperienced fancies of apprentices, of workmen whose prejudices are stronger than their judgments, and of caterers to popular errors keep up these follies. The only clearance required in any cutting tool is that which allows the cutting edge to do its work without being impeded by the drag of unused portions of the tool. Take so common a tool as the shears or scissors where two blades work one against—opposite or past—each other. Where the blades have almost a knife section, the material is necessarily cramped and curved from a right line by the lack of backing in the blades, and it would not be surprising if it pressed the blades apart.

Blueing Steel.

The mode employed in blueing steel is merely to subject it to heat. The dark blue is produced at a temperature of 600°. The steel must be finely polished on its surface, and then exposed to a uniform degree of heat. There are various ways of heating the article, e. g., over a flame producing no soot, by a hot iron or other heated metal, and by means of wood ashes. A very regular degree of heat is necessary, and wood ashes are often used for fine work.

To Make Rubber Packing Air and Steam Tight.

The packing is brushed over with a solution of powdered rosin in ten times its weight of stronger water of ammonia. At first this solution is a viscid, sticky mass, which, however, after three to four weeks, becomes thinner and fit for use. The liquid adheres easily to rubber, as well as to wood and metal. It hardens as soon as the ammonia evaporates, and becomes perfectly impervious to liquids.

Hardening of Tool Steel.

Mr. Sagner uses for the hardening of steel for tools an apparatus of his invention, which he calls "regenerateur carburateur," in which the steel or rod iron pieces introduced take carbon to a certain depth only, according to requirement. Tools prepared in this manner acquire a great hardness on the outside and on the working parts, whilst the inside, containing less carbon, secures the strength of the tool.

Coloring Iron and Steel Black.

A brilliant black is produced on iron and steel by applying, with a fine hair brush, a mixture of turpentine and sulphur boiled together. When the turpentine evaporates, there remains on the metal a thin layer of sulphur, which unites closely with the iron when heated for a time over a spirit of gas flame. This varnish protects the metal perfectly, and is quite durable.

Shear Steel.

Shear steel is made by taking a heat on blister steel and hammering it thoroughly. Double shear steel is made by cutting up shear steel, piling it, heating it, then hammering again. The best shear steel is made from the best wrought iron. The shear steels are very useful on account of their toughness and the ease with which they can be welded to iron, and, when of good quality and well worked, they will hold a very fine edge.

A MOVEMENT has been made in England to get a fiber as paper stock to take the place of Espartero grass. The substitute proposed is the stalk of the raw flax.

WELL AUGERS.

We here present an engraving of the well auger and boring outfit manufactured by the United States Manufacturing Co., Washington, D. C., which has obtained high approval in western and northwestern States. The Company for many years was located in St. Louis, Mo., and notwithstanding they then sold the best well tools in the market they now sell still better tools, due to their long experience, improved facilities, and ambition to be foremost in this line. The combined premium outfit, as here shown, consists of the machine

proper, one auger (15 inch) proper, four couplings and shafting for 60 feet deep, one drill (4 inch) complete, two wrenches, one tumbling rod and two couplings for it, one sand pump, and a horse power. The derrick is put together ready for use, and a boy can set it up and operate it. The great and peculiar advantages claimed for this outfit for drilling are: 1st. There being no lost motion in the double crank A, which raises the drill; 2d, there being no swinging or whipping of the drill rope when the drill falls; 3d, there is no sudden strain on the horse or jerking on the traces when the drill falls. These three improvements peculiar to this machine are patented. The horse does the drilling; and when the operator wants to stop drilling and raise the drill out of the hole, he has simply to place one hand on the lever B, and throw the clutch C out of gear srom the wheel D, and this same movement continued engages the other clutch E with the wheel F, which turns the windlass and thus raises the drill. The same derrick is used for both boring and nrilling.

CARE AND MANAGEMENT OF STEAM ENGINES.—In giving instructions for the care and management of steam engines, too much stress cannot be laid upon the injunction: "Keep your steam always at the same pressure," as, although all engines employed for manufacturing purposes have governors, they are not always reliable or capable of meeting the requirements of varying steam pressures and varying loads. Consequently, if the steam is, through a neglect, permitted to rise above the working pressure, the engine will in crease in speed, which will induce a loss of steam, as every revolution above the speed at which the machinery is geared for the manufacture of the different material, is a waste; and every revolution the engine falls below the regular speed, is a loss of production.

THE workmen on a railroad near Denver, Col., have come upon a petrified forest at a depth of from ten to twenty feet.

Making of Paper Car Wheels.

The discs from which the wheels are made and cut circular by machinery with a hole in the centre for the hub of the wheel, are a little larger than the sizes required for the wheels, which are 26, 33 and 42 inches. Three of these discs are fastened together with the ordinary flour paste, applied by hand with a brush, and the triple sheets are piled together to the thickness of three or four feet. Then the mass is placed in a hydraulic press and subjected to a pressure of about 650 tons for three hours. When removed from the press each three sheets is found incorporated into a single solid board. These boards are sent up stairs to the heating room and subjected to a temperature of 120 Fah. for two weeks, or until every drop of moisture has been extracted. They are then sent down stairs and pressed again to straighten them, and pasted together, dried and pressed again and again, until they are of the thickness required of the wheels, having to undergo hydraulic pressure three times, and to remain in the drying and seasoning rooms some six weeks or even more. When the paper material for the wheel is prepared, it varies from four to five inches in thickness, according to the size of the wheel, and is as solid as the hardest wood. One hundred and seventeen sheets of ordinary straw board contribute to the paper structure of a 42 inch wheel, and one hundred sheets to a 26 inch wheel. After being thoroughly dried the paper block is carried to the trimming room and placed upon a lathe, the tender of which is given a steel tire to which the block is to be fitted, and it is turned to the required size, which is always a little larger than the interior of the tire that is to cover the edges of the paper. Then the block is handed over to the painter, who treats it to two coats, consuming about a quarter pound of mineral paint, when it is ready to be fitted into the tire. It is again removed to the ground floor, and forced into the tire by hydraulic pressure, applied at the rate of 3,000 pounds to the square inch, so that the paper blocks fit as closely as possible into the rim of the wheel, the whole structure forming a very compact mass. The hub is then forced into its place, and heavy iron plates fastened upon either side of the wheel by strong bolts extending through it. The wheel is then ready for use. A 42 inch wheel will weigh about 1,250 pounds, divided as follows: Paper, 185 pounds; tire, 560 pounds; side plate, 140 pounds; hub, 200 pounds; bolts, 50 pounds. The tires are of best German steel, made at the Krupp Works in Prussia; the wrought iron plates, hubs, and bolts are of American material, the casting being made at Pullman. American tires are not used, because not yet made in sufficient numbers to supply the demand.

NOVELTY IN TRAM-CAR AXLES.—A novelty in the way of tram-car wheels, or rather axles, has been recently patented by a Danish gentleman, the object of which is to allow the wheels to pass around sharp curves without the grinding action of ordinary wheels keyed on a rigid axle, for which purpose the axle is divided in the center, the end of one half having a hollow and that of the other a corresponding projection, somewhat similar to a ball-and-socket joint, the necessary stiffness being given to the axle by a tube which surrounds the axle and extends between the naves of the wheel, against which it bears by gun-metal collars. At the center, between the tube and the axle, is a gun-metal bearing, in which the axle can revolve. The wheels act in such a manner that in running along a straight line the wheels and axle turn together, as in an ordinary pair of wheels, but on passing round a curve the axle slips round in its joint, so that the wheel on the inner radius of the curve is retarded and the outer wheel accelerated in proportion to the sharpness of the curve, greater smoothness being obtained in the vehicle, and less wear and tear of the tire and rail.

PRACTICAL MECHANICS.

About Riveting.

BY JOSHUA ROSE, M. E.

If a piece of iron be pierced by punching, the shape of the hole will be determined by the difference between the diameter of the punch and that of the hole in the bolster, or die beneath it. If the two be of as nearly a diameter as will permit the punch to pass easily but without play through the bolster, the punched hole will be parallel, or nearly so, but if, as is usually the case, the hole in the bolster is larger than the punch, the punched hole will gradually widen towards the bottom. To what extent this will occur depends upon the amount of difference in the diameter of the punch and that of the bolster hole, since it increases in proportion as the hole is larger than the punch. The object of having the bolster hole largest is to enable the punch to pass easily through it and lessen the strain or amount of power necessary to perform the punching. An ordinary allowance is to make the bolster hole 1-16 part of the punch diameter larger than the punch. This allowance, however, may be decreased in proportion as the thickness of the plate diminishes, and must, under the ordinary conditions of punching, be increased as the thickness of the plate increases. A ready method of finding the allowance for any required thickness of plate is to draw a triangle, the base measuring two inches and the vertical line eleven inches, and to draw across it a line where the width is equal to the diameter of the punch. Beneath this, at a distance equal to the plate to be punched draw a second line, whose length will give the diameter for the hole in the bolster, at its top, when, for a short depth, the bore is parallel, so that its upper surface may be ground so as to keep the upper edges of the hole sharp.

The effect the taper in the punched hole will have upon the riveted joint depends upon the manner in which the plates are brought together. For example, there are two holes with the taper on the outside, the effect will be the same as a slight countersink, causing the rivet to draw the plates together, and on this account it is generally recommended that the punching should be so performed as to bring the plates together with the largest diameter of both holes. The position of the enlarged side of the hole is determined by the rolling or bending and by the manner of the plates. Rivets to be removed from punched holes should, to preserve the strength of the plates, be drilled (and not driven) out, the depth necessary to be drilled varying according to the shape of the hole.

The strength of the plate will remain the same whatever the relative positions of the enlarged sides of the holes; not so that of the rivet. Those of least diameter at the line of junction of the two plates will be the strongest so far as their area of cross section is concerned, which occurs because the rivet hole, being of larger diameter at the center, has permitted the rivet to swell and enlarge its diameter during the riveting.

As the conical rivet is riveted by hand, it gets comparatively cool before the riveting is finished. The blows during the latter portion of the rivet close the head down upon the plate, but at the same time have a certain effect in relaxing the rivet of the strain due to its contraction in cooling. In a countersink rivet, the rivet, being shorter, receives the effect of the blows more readily at the body, and therefore fills the hole better, while the holes being necessarily drilled on account of the counter-sink, there is less room for the rivet to fill. It is obvious that to enable the rivet to fill the irregularities of a punched hole, it should be, when heated, as good a fit to the hole as the circumstances will permit, because, under the most favorable of conditions, it will but fit at the smallest diameter of the hole, and must be spread to fill the enlarged diameter. In cases where the rivet head is accessible to hammer blows the rivet may be large enough to require a light blow to drive it home, which is especially desirable in hand riveting where the head cannot be so firmly abutted against the force of the riveting blows. If, however, the head is inaccessible to a blow, the rivet must pass through the hole sufficiently freely to pass home without causing delay in its insertion.

The Indicator and its Improvements.

Many of those familiar with the ordinary indicator are probably aware of the fact, though they may seldom reflect upon it, that the area enclosed by a diagram from one end of a cylinder does not really represent correctly the work done upon the piston at that end in one stroke, or half revolution, as it is conventionally assumed to do. The steam line, for example, correctly represents the total pressure impelling the piston forward, but the exhaust line does not represent the pressure opposing the motion of the piston at the same time. It shows the pressure opposed to the piston's motion on the return stroke, so that a vertical measurement across an ordinary diagram at any point will not show the effective force being exerted upon the piston and producing motion at that point, as might be supposed. In order to arrive at the actual force exerted in moving the piston at any moment, it is necessary to subtract the pressure represented by the exhaust line of the diagram from the opposite end of the cylinder. In practice, after an indicator diagram has been taken from one end of the cylinder, it is usual to uncouple the indicator and attach it to the opposite end, and as two diagrams thus taken are measured up in the same manner, and a mean taken of the two, if the load does change during the time of removing the indicator, no actual error, so far as the power is concerned, under ordinary circumstances really results, the back pressure being taken into account in both diagrams.

The main object sought to be attained by the latest improvement in indicators is to depict on the card the actual effective work done on the piston during the double or forward and return stroke, or whole revolution, the pressure registered at any point representing simply the actual difference between the forward pressure and the pressure resisting the piston's advance, that is, the back pressure, at the same moment. This is effected by means of two pistons, the one being in communication with one end of the cylinder, and the other piston, which is attached to the piston rod, being acted upon by the pressure at the opposite end of the engine cylinder at the same time. In this manner the indicator pencil moves up or down by virtue of the difference of the impelling and opposing pressures, and a correct registration of the effective force moving the engine piston is obtained. The paper drum and upper part of the indicator are constructed in the ordinary manner, but instead of the single-way steam inlet there is a two-way inlet, one of which communicates with the interior of one end of the engine cylinder and the other with the interior of the opposite end. These two inlets or passages are separated by means of a partition in the body of the indicator through which the piston rod, common to both pistons, passes. The pressure from one end of the engine cylinder acts upon the lower piston of the indicator, the pressure recorded on the diagram thus being the result of the two, and the whole closed curve above and below the neutral or atmospheric line is work done in a single revolution, or during the forward and backward stroke of the engine piston.

Many engineers in order to arrive at a somewhat similar result, place the diagrams from opposite ends upon the same card. In this way the forward pressure and resisting pressure at the opposite ends are seen at the same time, but this often makes a very complicated card, and is not nearly so lucid as in this arrangement, where the effect of the return stroke is shown below the atmospheric line, and the complete diagram can be readily measured across. It is also open to the objection that the diagrams represent two halves of different revolutions, in which the conditions of working may have widely varied. Where loads are very variable and changing, this instrument appears likely to be extremely useful and handy. Those who have had much to do with the indication of steam engines know the difficulty and loss of time which are often experienced through having to shift the indicator from one end of the cylinder to the other. When a diagram has been obtained from one end of the cylinder with the heaviest or any particular load on the engine, it sometimes happens that considerable time will elapse before all the same conditions can again be attained in order to take the diagrams from the opposite end, and we have known many instances, such as in the indication of rolling mill engines, saw mill engines, etc., the load on which is seldom many minutes alike, where the attempt to obtain precisely similar conditions for the indication of the opposite ends of cylinder has had to be abandoned altogether. Such an instrument as this, under such circumstances, would have enabled the work being done on both sides of piston to be recorded during the same revolution.

The improved indicator we have described is designed to be fixed in the middle of the engine cylinder, and by closing or opening a valve or tap in either of the two steam passages communicating with the cylinder ends, separate diagrams may be taken for each end of the cylinder. When such separate diagrams and a combined diagram are taken on the same card, a graphic result is obtained which will give every desired particular and greatly facilitate calculation. The aperture in the partition through which the rod connecting the two pistons passes is carefully bored to fit the rod, so that no escape of steam from one piston to the other may take place. The pistons being very accurately guided to move in a straight line, there will be little or no friction, and consequently little, if any, wear tending to enlarge the hole in the partition, and cause steam to pass from the steaming to the exhaust side. We shall, perhaps, be pardoned for mentioning that great stress is laid by most makers of indicators and by many engineers on the importance of attaching the instrument as close to the ends of the cylinders as possible, and avoiding long, narrow, or tortuous passages from the cylinder to the indicator. We have known where an indicator has been placed on a pipe the length of the cylinder distant from one end, the steam to be shown very late when the valve had actually a quarter of an inch of "lead" on the centre. This fault may be avoided by having the pipes communicating with the indicator at least of sufficiently large size. It would be curious and instructive to see a diagram taken with this indicator from an engine having a large amount of "lap" on the valve with early cut-off, low terminal pressure, and a large amount of compression. In such a case the steam line, owing to the preponderance of the compressive pressure, would fall considerably below the neutral line at some distance from one end, and also cross it, and rise considerably above it at some distance before the opposite end of the stroke was reached.

The Manufacture of Tiles.

Tiles being a thinner ware than bricks, have to be made of a purer and stronger clay. They also require more careful treatment, but the process of manufacture is not essentially different. There are many varieties of tiles, but for practical purposes they may be reduced to three, namely, paving tiles, roofing tiles, and drain tiles. In weathering, the clay is spread in layers of about two inches thickness during winter, and each layer is allowed the benefit of at least one night's frost before the succeeding layer is put upon it. Sometimes the process is affected by sunshine. The comminuted clay is next placed in pits and allowed to mellow or ripen under water. Then it passed through the pug mill, and the tempered product cut in thin slices with a piece of wire fixed to two handles, in order to detect any stones, and then passed through the pug mill again, after which it is generally ready for moulding. To take the case of pan tiles (hand molded), the molder turns the tile out of the flat mold on to the washing-off frame, on the covered surface of which, with very wet hands, he washes it into a a curved shape. Then he strikes it with a semi-cylindrical instrument called the splayer, and conveys the tile to the flat block, where he deposits it, with the convex side uppermost, and, removing the splayer, leaves the tile to dry. The tile is afterwards beaten on the thwacking frame, to correct any warping that may have occurred, and trimmed with the thwacking knife. In the kiln, which is constructed with arched furnaces at the base of a conical erection called the dome, the tiles are closely stacked in upright position, on a bottom of vitrified bricks. The fuel used is coal, and burning continues usually about six days. In making pipe drain tiles, the clay is first molded to a proper length, width, and thickness, then wrapped around a drum; the edges are closed together, and the tile is carefully shaped by the operator's hand, sometimes assisted by a wooden tool. Tiles, as well as bricks, can be made by machinery; with suitable dies almost any form of tile may be thus had.

Care of Belts.

Belts should never be oiled except when they become dry and hard; and then the oil should be used very sparingly. Oil not only rots the leather, but causes the belt to stretch. Lukewarm tallow is advised for oiling by excellent authority. It is well to add resin when belts run in damp places. It is false economy to use as narrow and short belts as possible in order to save expense. The small amount saved is lost many times over by stoppage of machinery, slipping of bands, extra strain on the shafting, and an increased amount of friction, requiring additional driving power, and causing the more rapid wear of belts. Stretching the belt over pulleys too tightly is apt to cause the lace holes to tear out. The more thoroughly stretched the belt is when made, the more likely it is to tear when subjected to undue strain. A belt not properly stretched in the process of manufacture will yield readily when tightened over pulleys and used, thus relieving itself of the extra strain above what should be put upon it.

A NEW RIVETING MACHINE.—Messrs. De Bergue & Co., of Manchester, England, have constructed a new riveting machine, designed to work up to a pressure of 70 tons. The supporting pillar, instead of being firmly fixed to the frame, passes through a planed gap, and extending downward is pivoted at the pot. It is held in an upright position by two strong tension bolts, which are drawn tight by the action of water in a hydraulic cylinder at the back of the machine. This cylinder is in direct communication with a smaller cylinder, closed at its upper end, and loaded with dead weights like an ordinary accumulator. To prepare the machine for working, a screwed plug is removed from the top of the weighted cylinder, and water is poured in until both cylinders are quite full, and with a few strokes by a small hand pump, raising the weighted cylinder a few inches, the pressure is put on. This pressure is common to both cylinders, and is determined by the load upon the vertical cylinder, which can be regulated at will. Whatever weight is used, the resulting pressure on the head of the rivet can be abso

lutely relied on as constant and unvariable, and no renewal of water or further attention is required after the apparatus is once charged. When the heading ram presses the head home the holding-up pillar yields, and the arrangement dispenses with all valves and pumps, while it is claimed in the place of a momentary crushing blow, which is given by a weighted accumulator falling through a considerable space, in the new machine the force exerted is a slow, steady squeeze, with a pressure which can be varied as is required.

RAILROADS AND TRAFFIC.

WORK on the Connotton Railway will be vigorously pushed. The fifty miles of road from Canton to a point five miles out of Coshocton will at once be graded, and a right of way for a further extension of business to Zanesville is to be looked for. This extension has not, however, been voted, nor has it, so far as the public is aware, been determined what route such extension will take. The line authorized stops at a point far enough out of Coshocton to allow the adoption of either of two lines, and it is understood that the one will be chosen which private capital will most assist in securing the right of way for. Coshocton and Zanesville are bidding against each other in this matter. The development of business on the road already built requires twenty or thirty additional freight and mill cars immediately, and they will be secured. The coal contracts with the Ohio Coal Company, just revised, will add to the earnings of the railway. General Manager W. W. Hummerford estimates that 800,000 bushels of wheat will be transported on the Connotton Valley road this season.

A COMMITTEE of the incorporators of the proposed Columbus & Cincinnati Railroad has been organized. George Melvin is President. The road is run from Columbus to a point on the Marietta and Cincinnati road between New Lexington and Clinton Valley, a distance of sixty miles. The capital stock is two million dollars.

A COMPANY of well-known Chicago capitalists has been incorporated to build a railway to be operated by electricity between that city and Pullman, some fifteen miles south. It is estimated that the cost for an elevated road to the city limits will be about $150,000 a mile. Thence to Pullman it is proposed to build a surface road, the cost of which will be light.

THE production of steel rails in this country last year was 1,200,000 gross tons, and the importation was 222,597, making a total of 1,422,597 gross tons, in round numbers. At the present rate of ocean freights, English steel costs over $60 to import.

THE Railroads terminating at Chicago have determined to place in public warehouses all baggage brought in by their trains that is allowed to remain in their depots more than twenty-fours after its arrival, and to charge 25 cents storage for the first day, and from ten to twenty-five cents for each subsequent day after the first that the baggage is held.

A NEW station indicator will soon be adopted on the trains of the Reading Railroad. At the end of the car is an oblong box containing the names of the stations on a ribbon. Over the top of the box is printed "next stop," and the name of the station at which the next stop is to be made shows through the opening in the door of the box. The shifting of the names is controlled by the engineer on the locomotive, who has a small indicator in the locomotive cab bearing the names of the stations, and he thus knows whether the apparatus is set right.

ENGRAVING ON ZINC.—A Frenchman has been making some very interesting investigations on the use that can be made of amalgamated zinc. The property of an amalgam of zinc and mercury to repel fatty ink is already known, so that if lines be traced with mercury on a zinc-plate, and an inked roller passed over it, the drawing will not take up any of the ink. If, instead of inking the plate, a very dilute solution of nitric acid (2 cub centim of acid in 100 grammes of water) be flowed over it, the amalgam will be dissolved, and the lines consequently be etched in; on the contrary, if hydrochloric acid is used, the amalgam is not attacked, but the zinc is dissolved, and the lines are left in relief. Now, proceeding on these principles, coat the surface of a zinc-plate with some photographic preservative medium, such as bitumen of Judæa, or bichromated albumen. The parts where the metal is exposed can be acted on by mercury, either in a liquid state, or in the form of a solution of salt of that metal (like the biniodide), and will be converted into the amalgam, which can then be treated so as to produce the image either in relief, or in etching, as may be required. Another method of procedure would be to take a copy of a line drawing by the gelatine process, and then dusting the image, while still in a humid state, with powdered biniodide of mercury. This, when dry, would be applied to a plate of zinc, and a copy of the image would be produced on it in amalgam. By plunging the plate into a bath of hydrochloric acid, as before, the image will be obtained either in relief or engraving.

Curiosities of Steel.

The chemical constitution of steel is so slightly different from that of iron that no formula can definitely determine the amount of difference so as to give exact directions as to the proportions of parts; for commercial steels are really compounds.

The percentage of carbon in steel and in iron is not great in difference, and the amount of increase or diminution necessary to make either—ar rather to effect the transformation—is so slight that even chemists and experts do not agree as to its proportions. We speak of "carbonized steel," capable of receiving temper, and of being made into cutting tools and other forms where great resistance or endurance is required in use; of "decarbonized steel," incapable of being tempered, but having better resisting and enduring qualities than iron; of "mild steel," "Bessemer steel," "Siemens-Martin steel," "low steel," and give the metal perhaps other local and technical names; and yet it is hard to make a definite statement of the changes necessary to turn iron to steel, impossible to make a recipe for the purpose, and not easy to set up limitations to keep the mild steel from becoming high steel, or to determine the amount of change necessary to define iron and steel of the various grades.

Steel is not, as sometimes popularly believed to be, iron freed from all its impurities and deprived of all its extraneous adjuncts; pure iron is never found in commerce and is only to be obtained by the careful processes of the chemist's laboratory. In its pure state iron loses much of its value as a material in the arts, and is equalled in its principal qualities by other metals. Pure iron is too soft for any of the uses to which commercial iron is so largely applied, and oxidizes too rapidly to be durable. Steel is rather another form of the composition we call iron, and so far as experiments, extending over a period as lengthy as the written history of the race, can suggest, differs mainly from iron in containing a different proportion of the substance we call carbon. This difference although slight, is sufficient to greatly change the resultant combination. While iron is soft and open, steel is hard and close grained; while no amount of heatings and sudden coolings can harden iron, except to a very superficial extent, steel is readily hardened by being suddenly cooled from a certain heat.

These remarks apply mainly to the differences between iron and high steel—steel capable of being tempered. The "low steel," "mild steel," "Bessemer" and other names by which partially converted iron are known, ought not to be called "steel." The name is a misnomer, and it has recently been earnestly advocated at a meeting of manufacturers in England to propose and introduce a new nomenclature which should more definitely designate the different qualities of iron in its commercial form to steel in its various grades and as adapted to various uses. It would be well if such a recommendation could be universally adopted and generally acted on. At the present the public is greatly misled by the use of the term "steel," in designating the substance of which razor blades and railway rails, surgical instruments and steam boilers, pocket knives and Krupp's guns are made, as though the same material was used in one and all. Nothing could be more misleading. The steel plates of a boiler or ship's side have no more in common with plate steel from which saw blades are formed than nickel has with copper. And many other illustrations might be given to show the great divergence of the same quality held in common, and the number of qualities not possessed in common by the material coming under the single denomination of steel.

NEW PATENT PISTONLESS PUMP.—Messrs. Schaffer & Budenburg, of Manchester, England, have brought out a new patent pistonless pump. Its main features resemble the ordinary pumps of its class, but its peculiarities are special valves to control the inlet of the steam with an apparatus for condensing the steam more rapidly and so accelerating the speed and increasing the duty of the pump. This improvement is an important one and consists in the addition of two bent pipes. Each of these pipes is open at its lower end and communicates with the lower part of one of the chambers; the other end of the pipe is provided with a back pressure valve and rose, and is so placed as to occupy a central position in the upper part of the opposite chamber. To gain an idea of the functions of these bent tubes we will suppose that the pump is at work, and that while the steam is entering one of the chambers and displacing the water therefrom, the other chamber is closed by the rocking valve against the access of steam. This closed chamber at the commencement of the stroke is filled with high pressure steam which ordinarily would be condensed by contact with the cold surfaces of the water and of the sides of the chamber somewhat slowly. By the addition, however, of the bent tubes this condensation is hastened, for the live steam entering the open chamber not only forces the water through the delivery pipes, but also through the bent tube into the closed chamber, where it is distributed in the form of spray into the midst of the steam, thus creating an immediate vacuum. With regard to the chamber into which the steam is entering, it will be observed that a sudden enlargement is formed in the lower part of each chamber. As soon as the water passes below the level of the upper portion of this enlargement, a sudden increase of area occurs, and a corresponding immediate reduction of pressure results. As a consequence of this the rocking valve is momentarily displaced, when, the steam obtaining access to the vacuum chamber, the valve is completely closed on the opposite side. This cycle of operations is repeated for every stroke of the pump.

AMERICAN TRADE IN JEWELRY.—The variety of the patterns in American jewelry is unequalled in any part of Europe, and among the high-class makers every object manufactured is a genuine work of art. There are, it is said, no less than a thousand different designs in lace pins, as many more in earrings, and an equal variety in many other articles. We have not only the most complete machinery, but the largest establishments in the world for the manufacture of jewelry. The most extensive house in Europe (a firm in Paris) has but 150 workmen, while a single factory in Newark keeps 500 busy upon genuine gold work in ordinary times, and there are several other American houses which employ from 100 to 300 men each upon high-class goods. The great firms are chiefly engaged in the production of a few specialties. The desire for novelty which is characteristic of most Americans has a marked influence upon the jewelry trade, to whose prosperity and extent it largely contributes. Much of our lower-grade jewelry is exported to South America and Australia, and a considerable quantity of our middle-class jewelry is sent to England, where its novel styles cause its sale. There is one firm of gold pencil makers here who are scarcely known to the American trade, as they manufacture exclusively for the English market. Their goods are of the cheap class, but some of the very finest American gold pencil-cases and pens are sent to England, and so are "charms" and other trinkets which afford a particularly wide scope for novelties. Of very cheap German and Birmingham goods, such as gold fancy trash, there are large quantities imported. Owing to its trifling cost, flimsy silver filigree work, made in Genoa, is also imported by the bushel, though its quantity is vastly inferior to that of American goods of the same general description. The changes in the fashions of jewelry are in nothing more striking than in gems and their settings. At present there is a fashion for a combination of onyx and silver, and in Europe there is a prevailing taste for jewelry of embossed silver combined with gold of different colors. The price of diamonds has lately advanced some 25 per cent., in consequence of the "corner" effected in the South American diamond fields by a company of English capitalists. There is now a strong fancy for colored stones and blue diamonds, which a few years ago were rated as off-color and inferior to the white, but are now especial favorites. If a pure white diamond is worth $175 a carat, a blue diamond of the same quality will bring $250 a carat. The sapphire is also in great demand, its value having risen 50 per cent. in the last year, and for fine rubies, of the admired "pigeon's blood" color, only fancy prices can be quoted. The topaz and the yellow diamond are exceptions to the popularity of colored gems, though lemon-tinted diamonds are not so lightly esteemed as stones of other shades in yellow.

INDIA is apparently to be no mean rival of ours in the grain markets of the world. It is reported that 45,000,000 bushels of grain are to be shipped from East Indian ports during the coming season. This will give employment to a large amount of shipping as it will require about 1,000,000 tons to move it. Already indications are given that some of the British steam tonnage trading to this country is to be sent to India to meet the demand which will probably arise for vessels. As India and Australia become heavier shippers of grain the grain growers here will probably awake to the fact that the United States must make some trade concessions, if they are to find foreign markets for their surplus products.

MINES AND MINING.

THE situation on the Comstock lode, Cal., appears to be more disheartening than ever. Several failures have occured among prominent San Francisco speculators who were large holders of stock, the disposal of which added to the depression already existing, while the failure to develop a bonanza in Union Consolidated, and no effort to drain the South End mines, seems to be shaking the patience of the most faithful

THE correspondent of the N. Y. *Mining Record* writing from Silver City, New Mexico, says: The Santa Rita Copper Mining Co. is another and the largest enterprise in this district, situated about eight miles southeast of Georgetown. The Company have recently erected and have now in operation, successfully, a forty-stamp mill besides two large smelters, hoisting works, etc., under direction of the president, Mr. J. P. Whitney. The copper mines owned by this company were worked by Spanish convicts over two hundred years ago, and the enormous dumps containing millions of tons, attest conclusively the vast extent of the ore bodies. A glance shows that they are veritable bonanzas. Lake Superior will have to look to her laurels before long to keep pace with the future production of copper bullion from this Territory and Arizona.

DURING the months of March and April 19,640 tons of ore were mined and milled from the Father de Smet mine, Dakota, producing in bullion $82,-275—at a cost of $37,000, being a total cost of mining and milling of less than $2 per ton.

THE Tombstone, Arizona, product for April was $512.816. This is the largest output of any month.

THE Calumet & Hecla Mining Company has been experimenting for some time on low grade sand, or "tailings," heretofore considered unprofitable for smelting, but new and improved processes of smelting have been applied and it has been found profitable to work this material.

GOVERNOR A. C. Hunt, of Texas, has sold three coal mines to the Rio Grande & Pecos railroad company for $2,000,000. This property cost the governor $20,000 about five months ago. The deed of conveyance is on record at Laredo.

AGENTS have been sent out by iron works in Missouri and Tennessee to buy and make contracts with the mining companies there to furnish large quantities of crude ore and pig iron.

IT is stated that half a million dollars has been paid for the proprietary interests in the Vermont Copper Mining Company of Ely, Vt., and that the company is to be organized under a new management. The mine is claimed to be the best in the United States after the Calumet and Hecla. The retiring company has employed 700 men, with a pay-roll of upward of $25,000. The mine furnishes employment to 1,700 men, and the entire village of Vershire, where the mine is located, is dependent upon this enterprise for its support. The mine has paid its owners upwards of $160,000 in a single year, but many years of hard labor were spent and it experienced many vicissitudes before it reached a dividend-paying basis. For the first 600 feet in depth the contents of the vein did not average over two per cent. in copper, but the owners with indomitable perseverance, pushed on and were rewarded by finding ore bodies which have proved veritable bonanzas, and which at the present depth are apparently inexhaustible. The main shaft is now down 3,000 feet, on an incline of about twenty-five degrees from the horizon. At present twelve furnaces are running constantly, turning out matte of about ninety-five per cent. copper.

THE copper product of the United States during the past year was 72,300,000 pounds, only 7,000,-000 pounds of which was exported, the 64,000,000 pounds being consumed at home. The consumption of copper in 1881 is estimated to have been 60,000,000 pounds, while 7,000,000 pounds were exported, leaving a stock on hand, on December 31, 1881, of 17,000,000 pounds. The product last year amounted to 55,000,000 pounds from the mines on Lake Superior, and to 19,000,000 pounds from other sources, and adding thereto the stock left from the previous year, 10,000,000 pounds, the total available supply is 84,000,000 pounds.

An Improvement in Ice-Machines.

Among scientists and others interested in the manufacture of ice or the production of cold by artificial means, a problem has been, how to utilize ammonia as a producer of cold without the necessity of employing the excessive pressures which have heretofore been necesary, and which were the chief objections to its use. In the production of artificial cold, ether and sulphurous acid have been, with ammonia, the principal agents employed. The principal objection to ether has been that it is highly combustible, and saponifies when brought in contact with the lubricating grease used in the gas-pump. While sulphurous acid has the advantage in an energetic production of cold, the pressures required are too high, and by contact with water it forms sulphuric acid, which corrodes the valves and other portions of the machinery employed. The chief objection to ammonia, the most vigorous cold-producer has been the excessive pressures resultant from its use, 125 pounds to the square inch at rest, and from 225 to 300 at work. Messrs. Leonard F. Beckwith and Rossi, have discovered a method of liquifying ammonia through its absorption in gaseous form in glycerine, and the consequent production of cold at a low pressure. This method of producing cold utilizes the best known agent, and overcomes the chief obstacle of its use, the necessity of high pressures. The non-volatile liquid glycerine was found to absorb about 600 times its own volume of ammonia, producing a binary liquid containing a volatile agent absorbed in a non-volatile one. After being placed in the refrigerating machine, a vacuum is mechanically created, the ammonia separates from the glycerine, and an intense cold is produced. The ammonia is reabsorbed in a condenser by the glycerine, and then passes into the refrigerator tank ready to be again used. This method of producing cold is constantly carried on while the machine is in operation, and the waste is comparatively small. Practical tests of this new system of producing cold artificially have recently been had before Prof. Charles A. Seeley, an expert in such matters, and other gentlemen. The result showed that in fifteen minutes after the machine was put in operation, the temperature of the refrigerator was lowered from 68° Fahrenheit to 18°, and ice was formed in twenty minutes from the time the machine was put in operation. The vacuum under which the ammonia was volatized in the refrigerator where the binary liquid was placed was twenty-five inches, and the pressure under which the ammonia was reabsorbed in the condenser into the fresh glycerine was an average of twenty-five pounds, never exceeding fifty pounds. There is, it will be seen, a remarkable difference between this and previous methods employed when ammonia has been used, and when the pressure has averaged 125 pounds at rest, and from 225 to 300 pounds when at work. The mechanical compression heretofore required in the use of ammonia is done away with, and the much easier method of chemical affinity substituted. The new plan, if wholly successful, will do away with the necessity of the use of heavy machinery that has been an absolute necessity when ammonia was used as the cold-producing agent. The machinery used, is easy to manage. Under the old conditions, when ammonia was used, the services of an educated, careful, and skillful engineer were an absolute necessity, or a destruction of the machines would follow.

INSPECTION OF LOCOMOTIVE BOILERS.—The following regulations for the inspection and test of locomotive boilers have been adopted and published by the Massachusetts Railroad Commissioners under the provisions of chapter 73 of the acts of 1882: 1. All boilers for locomotives, before going into service, must be subjected to a hydraulic pressure of 150 pounds per square inch. 2. The water must be heated to near the boiling point. 3. This test must be repeated at least once a year. 4. The superintendent of motive power, master mechanic, or other proper agent of the company will attend in person. He will remain outside, while an assistant will examine the fire box from the inside. 5. A record of all tests will be made, giving dates and anything worthy of mention, and communicated to the board 6. Special examination of the stay bolts of locomotives in service should be made not less frequently than once in three months. 7. When these examinations are made, all the water must be drawn from the boiler, so that the vibration of the sheet may indicate any unsoundness of the stay bolt when it is struck with the hammer. The board urgently recommends, in addition to these regulations, that the four upper rows of stay bolts shall be drilled from the outside ¾ of an inch in depth and 3-16 of an inch in diameter.

EARLY SUPPLIES OF PETROLEUM.—The earliest evidence of the use of petroleum is found in the ruins of Nineveh and Babylon, in the building of both of which an asphaltic mortar was employed, the asphalt of which was a partially evaporated petroleum. That used at Babylon was obtained from the springs at Is on the Euphrates, which, at a later date, attracted the attention of Alexander, Trajan and Julian, and even still supply the neighboring villages with oil. The oil wells of Zante were referred to by the Herodotus 500 years before Christ, and Pliny and Dioscorades mention the oil of Agrigentum, the so called Sicilian lamp oil. As to the durability of oil wells it is sufficient to state that in one of the Ionian Islands there is a spring which has yielded petroleum for more than 2,000 years; and the springs of Rangoon, on the Irrawaddi, have been tapped for ages. Before the general introduction of petroleum among civilized nations the yield of the wells in this district is said to have been 400,000 hogsheads of oil per annum. The perpetual fires burned at pagan shrines are supposed to have been caused by springs of petroleum ignited at the surface. Petroleum has long been collected by the American Indians, and was sold by them as Seneca oil, and applied to various useful purposes, and many American authorities believe that before the Indians the race of people who worked the copper deposits of Lake Superior, the lead mines of Kentucky, and built the mounds in the Western States, also dug numerous wells in Pennsylvania, Ohio and Canada, to collect the oil which flowed into them. One of these prehistoric wells at Titusville, Pa., was, upon being cleared out, ascertained to have been twenty-seven feet deep, and between five and six feet in diameter, and to be cribbed up with logs to the top. In another a notched tree was found still standing in the position in which it had been used for a ladder. As early as 1836, from fifty to one hundred barrels of petroleum were collected annually in the valley of the Kanawha, Virginia, and sold as a medicine. It was not, however, till oil from coal and shale had been successfully introduced with lamps especially adapted for this class of oils, that attention was directed to the petroleum springs as likely to furnish a cheap supply of material. The introduction of shale oil may be dated from about 1834, when Selligue, in France, manufactured it on a large scale, and introduced it for lighting. Gesner manufactured it in Prince Edward's Island in 1846, and four years after James Young, of Glasgow, introduced paraffine oils made from the afterwards celebrated Torbanehill mineral. The industry was exceedingly profitable and extended rapidly. It was quickly introduced into Germany, where the material used was either the Torbanehill mineral imported from Scotland or some of the rich bituminous shales with which Germany abounds. But curiously enough the petroleum deposits seem to have been altogether neglected until within the past two or three years, probably because the plant had been erected and all necessary arrangements made for producing the oil from the shale, and thus removing the great inducement which would otherwise have existed for obtaining the cheap natural product. But the extension of the American oil trade, and the prospective displacement of shale oils in Germany by an imported article, gave rise to energetic exploration, and the result has been eminently satisfactory.

THE Boston *Bulletin* has the following: The lowest rate for carrying California wool from San Francisco to Boston is two and three-fourths cents a pound, but the same railroads that make this charge contract to bring Australian wool all the way from Australia to San Francisco by sea, 7,000 miles, and by rail from San Francisco to Boston 3,000 miles, for two cents a pound. It seems that the further a thing has to be carried the less the carriage costs. If the rule were extended further it might be found that wool could be shipped out of the front door of a Boston warehouse, carried round the world, and brought to the back door of the Boston warehouse for nothing.

When writing to advertisers mention this paper.

ITEMS OF INTEREST.

THE total shipments for April's account of the Standard mine, Cal., was $145,620.

THE Elson Glass Works Company have decided to locate at Martin's Ferry.

PETROLEUM exports since January, 24,232,574 gallons, against 12,076,704 gallons same time 1881.

THE annual wire product of the United States is said to be 135,000 tons, and England 200,000 tons.

INDIANA loses as much by fire every year as the full product of her crops of potatoes, tobacco and barley, the amount being considerably in excess of $3,000,000.

IRON can be rolled so thin that 10,000 sheets would only equal 1 inch in thickness, or about 80 sheets to make the thickness of one of Esterbrook's bank pens.

THEafirst ppearance of cotton as an article of commerce was a shipment of seven bales from Charleston in 1757. In 1880-81 the crop was 6,000,000 bales.

THE news about the coming crops in the west continues on the whole favorable, particularly for Kansas and Nebraska, where an extraordinary yield is expected.

AMERICAN locomotives to the value of $4,000,000 were exported during the last six years, in spite of the fact that iron and steel are "so much cheaper in England than in this country."

WASHINGTON county, Pa., is said to be the largest wool-growing county in the Union, and to produce annually 2,500.000 to 3,000,000 pounds of wool, worth in cash $1,00C,000.

OF the 74,000,000 pounds of copper produced last year, it is estimated that 60,000,000 pounds were required for home consumption. and only 7,000,000 pounds were exported.

IT is not surprising that the French people are skilled agriculturists, as farming is taught practically and theoretically in 27,000 out of 34,000 public schools in the country.

THE Martin's Ferry Stove Company with a capital of $10,)00, with privilege of increasing the same to $100,000, have taken out a charter in West Virginia, and have let the contracts for their different buildings.

THE smallest circular saw in use is a tiny disc about the size of a 5-cent nickel, which is employ ed for cutting the slits in gold pens. They are about as thick as ordinary paper, and revolve 4,000 times per minute. Their high velocity keeps them rigid, notwithstanding their extreme thinness.

OFFICIAL reports from the Bureau of Statistics at Washington show that during the current fiscal year the decline in the American exports of breadstuffs to foreign ports reached the prodigious sum of over $67,000,000, as compared with the previous fiscal year. This was caused by short crops last year and high prices.

A WEALTHY land-owner in the Tyrol has made an application of the microphone to the detection of subterranean springs. He fixed the microphones at the spots where he supposed water might exist, each being connected with its telephone and battery. Then, at night, he put his ear to each of the instruments and listened for the murmuring of the waters, and in several cases heard it.

THE wrought iron columns made by the Phœnix Iron Works for the Albany bridge are said to be the largest ever made. The length of each is 53 feet 3⅜ inches. Each is composed of 8 segments, the iron of which is 1 9-16 inches thick. Each column requires 894 steel rivets, and the weight complete is 18,806 pounds. The square inches of section are 104. The eight columns, therefore, contain 150,448 pounds of metal and 7,152 rivets.

THE clerk to the Washington House of Representatives Committee on public lands is preparing a tabulated statement of all the grants and donations of land by Congress to the States and Territories. The statement will show a grand total of 302,788,593 acres that have been donated for all purposes. It is a significant fact that over one half of these grants have been made to railroad companies.

MR L. B. Hodges, superintendent of tree planting on the Northern Pacific, has had over half a million trees planted along the line in Dakota, and and intends breaking every cut between Red river and the Yellowstone by rows of trees.

AN odd industry is the collection of ivy roots in the mountain counties of Nevada. The roots are shipped in large quantities to our eastern cities, and are used for making pipe bowls, door knobs, and other hardwood articles. The ivy grows in great abundance, some roots attaining enormous size; one was unearthed which weighed eight hundred pounds, supposed to be the largest ivy root ever found, and those weighing 75 to 150 pounds are frequently met with. Enormous quantities of medicinal roots and herbs are also sent east from the far west.

A TELEPHONE STORY.—A gentleman in Warren R. I., who has sometimes assisted in the transmission of messages by telephone, owns a beautiful pet dog named Pat. The dog, having lost sight of his master, went to the telephone office in search of him, and the operator understanding the object of Pat's visit, called for his master at a place where thought he might be, and informed that Pat was looking for him, and immediately answered, and placing the instrument to the dog's ear, he at once evidently recognized his master's voice, and started for the door, greatly excieed, and asked, in a dog's language to be let out that he might go in pursuit of him.

NEW INSULATING ELECTRIC MATERIAL.—The immense strides which have been made in electrical discovery, particularly in practical application, have compelled electricians to seek for new and cheaper insulating material than those already in use. Hitherto they have been limited to glass, porcelain, stoneware, gutta-percha, india rubber and ebonite. Owing to the greatly increased demand, the price of the last three named has risen very much, and is likely to rise still more; and, while the quality has deteriorated, it is impossible for the existing sources to supply what is needed, not only for telegraph and telephone work, but for the immense field opening in electric light works. The public require, before everything, safety in the use of electricity, and there is a corresponding demand for a cheap insulating material, the supply of which shall be equal to the demand likely to arise. This has now been met by the invention of a material called insulite. A method has been discovered by which wood, sawdust, cotton waste, and paper pulp and other fibrous materials can be converted into a material perfectly impervious to moisture and acids, easily molded under pressure into any shape, and capable of being worked or cut into any form. This material is an excellent nonconductor of electricity, and can be used for all forms of battery cells, telegraph insulators, supports for electric light leads, and telephone work. It affords the means of securing perfect insulation at a very much less cost than ebonite or gutta-percha. As it is perfectly impervious to moisture, articles made of it cannot shrink or warp. It supplies exactly what is wanted in practical work, in which ordinary wood cannot be used, because it absorbs moisture, and ebonite is inhibited on account of its cost.

DIVERSITY OF EXPORTS NEEDED.—People who consider the matter only superficially are apt to get an erroneous notion of the character and extent of our exports, often inferring from their immense aggregates that they are largely diversified. Only about seventeen per cent. of our exports are manufactured goods, and this amount is estimated to be only about four per cent. of the total domestic manufactures of the United States, while on the other hand the eighty-three per cent. of agricultural exports are only about twenty per cent. of the total production. But this twenty per cent. is very unevenly divided, as it includes, for example, eighty per cent. of our total cotton crop, but only about six and one-half per cent. of our total corn crop. The significant things to notice, then, about our export trade, are the relative smallness of our foreign markets for both agricultural and manufactured products, and the consequent importance of our home markets for both. But while there is every reason to believe that from year to year the indications are growing stronger that the countries of Europe will be permanent customers of ours in agricultural products, yet it must be borne in mind that contingencies may arise to seriously affect the trade, particularly in breadstuffs. The seasons in Europe may be good for a series of years, while the reverse might be the case here. A radical change in the land system of England and Ireland would increase the products of those countries. Agriculturists, therefore, should constantly be on their guard against the expectation of an increase in the demand for their products in the proportion of the increase during the last fifteen or twenty years, and against a consequent over-production. Moreover, European countries are almost the only customers for agricultural products that we have. The rest of the world buys comparatively nothing in this line of the United States. Obviously, then, now that we have practically secured a market for our surplus cereals and meats, it behoves us to bend our energies towards extending our export trade in manufactured goods.

REVIEWS.

A Tallahasse Girl. Round-Robin Series. Boston: James R. Osgood & Co.

The Round Robin Series has the characteristic that its authors are nameless, but these serial publications show that Messrs. Osborn & Co. can command a galaxy of talent. "A Tallahasse Girl" is a most effective and entrancing novel of southern life in its most interesting aspects, a seizure of its features before they have faded under changed conditions. Half a century hence it will be im possible to write a novel at once so vivid and so true. Throughout it evidently embodies actual personal observation. The chief scenes are laid in Florida's old capital, and prominent characters, of which the Tallahasse girl is the central figure, belong to the old Southern feudal aristocracy. Bereft of power over their former vassals, impoverished through the indirect effects of the war, they are in a maze between the consciousness of the past and the realities of the present. Among them are northerners and foreigners, who, besides being amusing, afford striking contrasts in thought and sentiment. Rich "characters" among the colored race play their parts. We heartily recommend this work as a most enjoyable novel, with far more originality than pertains to most novels published for summer reading.

The Art Amateur for June. A Monthly Journal Devoted to the Cultivation of Art in the Household. MONTAGUE MARKS, Editor and Publisher. NEW YORK: 23 Union Square.

This number contains a finely illustrated notice of the Paris Salon, with special reference to pictures by American artists. Other exhibitions of painting are vivaciously criticised. There are capital practical articles on modelling in clay, hints on the decoration of country "boxes," articles on illuminated manuscript, and hints for amateur illuminators. The departments of Ceramics, Bric-a-Brac, Needlework and Art in Dress are well filled, and there is the usual liberal array of designs for china painting, embroidery and general decoration.

The Century Illustrated Monthly Magazine for June. NEW YORK: The Century Co., Union Square.

The frontispiece is a fine steel life-like portrait of Cardinal Newman. The article "Around Cape Horn" presents a vivid view of nautical experiences, in text and engravings. "In the Chinese Theater" gives the play and criticizes the performance. "The Opera in New York," by Richard Grant White, is continued. "The Bee Pastures of California" presents scenes novel and interesting. "Marble Mining in Carrara" is equally so. The story "Through One Administration" is continued and increases in interest. Wood Engraving, the Century Prizes, are among the attractive subjects.

The London Quarterly Review for April. American Republication. NEW YORK: The Leonard Scott Publishing Co., 41 Barclay street.

The April number of this able review contains articles on the New Testament Revision, Jonathan Swift, the witty and sarcastic dean; English Poets and Oxford Critics; Life and Letters of De Busbecq, who was Ambassador of Ferdinand I. of Austria, at Constantinople; review of Mr. Lecky's England in the Eighteenth century; Journal of Caroline Fox; the Manchester School, and a searching conservative article on What Shall be Done With Ireland? in which certain remedial measures are proposed.

SCIENCE AND INVENTION.

ATMOSPHERIC ELECTRICITY.—At a recent meeting of the California Academy of Sciences, Mr. C. D. Gibbs, C. E., remarked that when surveying during the north winds, which are prevalent at certain times of the year, in the San Joaquin valley, the electrical disturbance was so great as to cause the needle of his compass to fly up against the glass and become useless during the first part of the day when in the field; but that if he took the same compass into a warm moist room it again acted normally. Engineers in Santa Clara and Calaveras counties report the same action and dip of the magnetic needle during the prevalence of the dry north winds. Dr. Harkness said these winds affected the human skin. Dry atmosphere was a perfect non-conductor, but all moist plants and animals, as well as men, then became so many miniature lightning rods. The nerves were at such times continually irritated by a constant succession of tiny blows, like telegraphic ticks, against the nerve centers. They contracted and produced a congestion of the organs; the blood became turbid while kidneys, liver, and lungs all suffered.

HEAT-ABSORBING POWERS OF SOIL.—A recent inquiry by Herr Wollny into the influence of color of ground on its heating, yields the following results: (1) The color of arable land of approximately the same nature affects its heating to a comparatively great depth. This influence is different according to the season, time of day, and amount of cloudiness. In the warm season, at the time of daily maximum of ground temperature, and with unhindered radiation, the ground is hotter the darker the color. The difference of temperature between bright and dark colored ground disappears more or less in the cold season, at the time of the daily minimum of temperature, with diminished insulation, and at great depths. (2) The daily variations of temperature are greater with dark coloration than with bright. They are generally greater the greater the differences in the mean temperature, and conversely. (3) The influence of color indicated in (1) decreases in proportion as the water-content increases, and other factors which determine the heating of arable land gain the preponderance. With great difference in physical properties, chiefly caused by a larger amount of humus, and water capacity, the influence of color may be wholly set aside.

MEASUREMENT OF HEIGHTS.—A useful little instrument called the hypsometer, for measuring heights of walls, timber, trees and spouting, and therefore valuable to surveyors, builders and artisans, has just been introduced. Take a triangle, composed of three slats similar to the carpenter's angle, and on each end of the longer side place a small sight vane; suspend from the lower side a metal ball to keep this side horizontal, and construct a handle, with a circle at its upper end, in which the triangle can rest and move, and by which it will slide into the proper position by the weight of the ball. Take the instrument by the handle and move backward until the two sights are brought into line with the top of the building or other object. The height will be found by adding the distance of the operator from the building to the height of the eye above the ground.

A NEW STYLE OF FURNACES.—A late combined portable furnace and boiler has the same sheet of metal forming the top of the furnace and bottom of the boiler. Removable supporting bars are secured to the sides or box of the boiler by means of wood-screws, for the purpose of holding in place the bottom of the boiler or top of the furnace, and also for holding the wings or sheet metal forming the sides of the furnace. The sides of the furnace are made internally convex and expanding outwardly, whereby the products of combustion are made to pass in a thin sheet under the sides of the boiler.

MARKETS.

FINANCIAL.

Office of TRADE REVIEW AND WESTERN MACHINIST.

FRIDAY EVENING, June 9.

Money has been easier, with a less active demand and a larger supply of loanable funds. Rates of discount in bank are 7 to 8 per cent; on prime collaterals money is obtained at 5 per cent. on call and 6 per cent. on specific time. Exchange has been in good demand, and rates are firm, although the tone of the market is a little easier. The current rates are par buying and 1.20@1.40 per cent. premium selling. Dealers buy commercial bills at 20 dis. @ par.

IRON.

There has been but a moderate business in pig iron, and caution characterises purchasers, the present extended strikes inducing a feeling of incertitude as to the future. A steadier tone characterises the market for manufactured iron. Prices and delivery in the localities of the labor strikes are made contingent on the settlement of the difficulties. Should the strikes at Pittsburgh and Cincinnati be of long duration, an advance in manufactured iron is certain. There is a good inquiry for plate iron; prices are unsettled, awaiting the development of the labor troubles. The decline of bar iron has been arrested by the strikes. We quote ordinary refined bar at $2.65 and upwards from store; refined bar at the mills, $2.50 and upwards. Bolt iron is quoted at $2 50 from store, and can be got from the mills as low as $2.35. Horse shoes are in good demand at $4.75 per keg, and horse nails are meeting with a good trade. Norway and Swedish are in fair demand at $4 for bars and $5 for shapes. For plate iron inquiries are good, but buyers show little disposition to wait for the settlement of the strikes, and the market is as yet unchanged. We quote Sheet Iron 4½@4¾c; do refined, 5@5¼c; galvanized, 8¼c for No. 20 and 9c for No. 24; Russia 11½@12½c. A good business is being done in the steel trade, and higher prices are anticipated.

CINCINNATI--(Reported by Rogers, Brown & Co.) The Pig Iron market is in an unsettled state, owing to the extended strike of iron workers. The close of the week found all the rolling mills, with perhaps half a dozen exceptions, from Pittsburgh to St. Louis idle. The Cincinnati strikers, being divided outside, are not likely to make a long resistance. It is believed the mills will all be running full within a week in this immediate vicinity. The mills at Ironton, Pomeroy, Ashland, &c., expected to go on without interruption during the strike, but are disappointed, their men ignoring verbal promises not to strike. There has been but little cutting of prices since the strike was inaugurated. Indeed, offers for forge iron, round lots, at close to full figures, have been declined by Southern furnaces this week. The demand for foundry grades, though confined to small lots for immediate use, is steady. Quotations below fairly represent the range of the week's business. These are for four months: Hot Blast Foundry—Hanging Rock CC. No 1, $27.00@$28.50; No. 2, $26.00@$27 50; Southern, No. 1, $26.00@@27.00; Strong Coke, No. 1, $24.00@25.00; No. 2, $23.00@$24 00; No. 3, $22.00@$23.00; Soft Stone coal No. 1, $23.00@24.00; No. 2, $21.00@$22.50. Forge--Strong, Neutral, No. 1. Mill, $20.50@$22 00; Cold Short, No 1 Mill $20.00@21.00. Car Wheel and Malleable Hanging Rock Cold Blast, $33@34; Hanging Rock Warm Blast, $27@29; Southern Car Wheel Iron $34@36; Lake Superior, $31@33; Lake Superior Malleable, $31@$33.

CINCINNATI—(Reported by E. L. Harper & Co.)—Business has been more active the past week, the general belief obtaining that little or nothing can be hazarded in purchasing at prices ruling. The purchases, however, have been almost wholly by founders, though the mills continuing to run are entering very fair orders. The anticipated conflict between the mill proprietors and the operatives has been realized, and the absence of mill orders will for a time produce a dearth in mill grades. There is reason to believe, however, the strike will be short-lived, and that such stocks as the furnaces may accumulate will be quickly taken up when the mills resume. The growing popularity of coke irons is making inroads somewhat upon the old reliable Hanging Rock Charcoal Irons, and the small supply of the latter may be found to be adequate to the demands of the trade when the healthy and vigorous fall business opens. The temporary inactivity, approaching inertia, in railroad extensions and equipments, will receive fresh vitality in the realization of the well-grounded expectations of a general good crop, and the moving of the wheels of the railroads once more bear the commerce and industry of the country toward renewed prosperity.

COPPER.

Sales have been somewhat restricted, consumers, as a rule, being supplied under pool contracts, and those who are not, purchasing only from hand to mouth. Lake is generally held at 18 1-4, and lower bids have been declined, although a round lot could probably be secured at a slight concession. Baltimore and other brands are quoted at 17 3-4 to 18 cents, but the tone of the market is dull and unsatisfactory. New Lake Copper is beginning to arrive, but thus far has all been absorbed under contract. A few weeks will witness considerable arrivals of copper for sale, not only from the Lake Superior districts, but from other quarters, and under the influence of competition a possible decline is looked for.

LEAD.

Sales of pig iron have been light. Prices have ranged from $4 50@$4 60c, according to brand and quality. The market is unsettled, and may be considered as favoring buyers. Refined is nominally $4.75.

TIN AND TIN PLATES.

In the market operations have been light. Straits and Malacca, in lots of twenty-five to thirty, have brought 21 1-2 cents each, while in a jobbing way, 21 5.8@21 3.4 cents is asked. London has fluctuated between £98 to £98.10. We quote for round lots Banca 28 cents; Straits and Malacca 21 5-8 to 21 3-4. Australian 21 3-4. English L. & F. 23, English refined, none here. There has been no quotable change in value of tin plate.

SPELTER AND ZINC.

The demand for Spelter has been wholly of a jobbing character. Values range from 5 5-8 cents to 5.75 for best brands. Zinc is without change, and parcels from store are held at 7 1-2 to 7 5-8 cents.

COAL.

Coal mining in this State is being carried on with less activity than usual at this season. There have been moderate arrivals. Lake shipments are by no means active. Freight rates have somewhat declined.

HARDWARE.

The hardware trade has somewhat declined in animation, but there is no misgiving that the scale of future business will be fair. Prices are unchanged. A large business has been done in nails, a considerable quantity being disposed of at full card rates, whilst mills are not disposed to enter into contracts at those rates, anticipating that the Western Nail Manufacturers' Association at its meeting in July will advance those rates, which are now $3.40 for 10d. to 60d., less 10 cents per keg for carload lots and 2 per cent. for cash. The most of dealers' sales at the present time are $3.25 net for 10d. to 60d. Carpenters' tools and agricultural and garden implements are in demand, also barbed wire.

LUMBER.

Sales at the lumber yards show an increase, and improvement is looked for as the season advances. Dealers buy considerably. Values are fairly maintained. In white pine some concessions have been granted. Yellow pine, with active inquiry, is somewhat unstable. Large lots of shingles have been disposed of.

WOOL.

A cautious feeling is manifested in the country markets. It is estimated that the new domestic clip will open at about 36@38c. Washed Ohio delaine is 46@48c.

LUMBER.

PLANK, MIXED WIDTHS.

2 inch, 12, 14 and 16 feet, together.

A 1 and 2	$50
A 3	40
B	32
C	21
D	15
E	13

1¼ and 1½ inch.

A 1 and 2	$48
A 3	40
B select	32
C	21
D	15
E	13

BOARDS.

One Inch, mixed widths.

A 1 and 2 uppers	$44
A 3	36
B select	30
C	20
D	15
E	13

STOCK BOARDS.

12 Inches wide.

A 1 and 2	$45
A 3	38
B	32
C	21
D	16

STRIPS.

6 Inches wide.

A 1 and 2	$42
B	35
C	22
D	17
E	13
Norway Fencing Strips	17
Norway Flooring Strips	25

WORKED LUMBER

FLOORING.

Flooring—A 3	$42
B	38
C	24
D	20
Norway Flooring—A 3	28
C	22
D	18
Matched Drop Siding, 6 inches—A 3	42
B	38
C	24
D	20

Beaded Ceiling $2 higher than Flooring.

One half inch Bevel Siding—A 1 and 2	24
A 3	20
B	18
Ash Flooring—A 1 and 2	40

BILL STUFF.

Small, joists, 12, 14 and 16 feet	$15
18 feet and under	$16

Timber, larger than 8x8 special.

Timber, longer than 18 feet, adds about $1 per foot per M. extra.

Cedar Posts, large	30 00
" " medium	25 00
" " small	$15 to 20 00

SHINGLES, LATH AND MILL WORK

Shingles XXX	$4 50
Clear Butts	3 25
Lath	3 00

Surfacing, one side, adds $1.25; two sides $1.50 | Matching, flooring and drop sidings, $2.50.

Lehman, Richman & Co.

IMPORTERS

AND JOBBERS OF

WOOLENS

And Manufacturers of

Men's, Youths', Boys' and Children's

CLOTHING!

86 & 88 WATER STREET, CLEVELAND, O.

invite the attention of close and short time buyers to the LARGEST STOCK between New York and Chicago, at prices guaranteed AS LOW as made by ANY responsible house in the United States.

FOR SALE.

One 15-H.P., mounted Threshing Machine.
One 10-H. P. Threshing Machine.
One 8-Horse Power.

Address
NATIONAL MACHINERY CO.
Cor. Bond & Superior Streets, Cleveland, O.

L. P. SMITH. JAMES OLWELL.

SMITH & OLWELL,

General Machinists,

Manufacturers of

STEAM ENGINES.

(STATIONARY AND MARINE,)

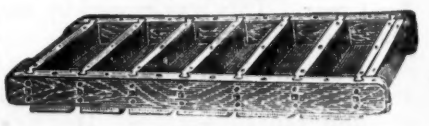
and Machinery of all descriptions.

116 Elm Street, Cleveland, O.

☞ Special attention given to Marine jobbing.

D. J. C. ARNOLD,

Manufacturer of



Brick Moulds, Off-bearing Trucks, Brick Wheelbarrows, &c.

All goods first class. Orders and correspondence solicited. NEW LONDON, O.

E. Fawcett. R. B. Fawcett.

E. FAWCETT & SON,

Proprietors of

ALLIANCE INDUSTRIAL WORKS,

Manufacturers of

STEAM ENGINES,

and Circular Saw Mills.

Specialty of Portable Saw Mills and High Speed Engines.

ALLIANCE, OHIO.

Cleveland Wholesale Prices.

HARDWARE.

Adzes.

Carpenter's.....per doz $18 40
Ship..... " " 18 75
Heavy railroad.... " " 19 50

Axes.

Hunt's.....℔ doz $ 9 50
Lippincott's Crown ℔ doz 9 00
Cut More ℔ doz 9 00
Peck's Double Bit ℔ doz 22 00
" Champion Blade ℔ doz 11 00

Anvils.

Eagle, Amer...per lb. 10c dis 20
Wright's.....10¾c@11c
Armitage's Mouse Hole 9½c@9¾c
Trenton.....10¾c
Wilkinson's.....10½c

Anvil Vise and Drill.

Millers Falls Co. $28.....dis 20
Cheney Anvil and Vise.dis 25&2

Vises.

Solid Box, list of July 1, '79, dis 35
Solid "Crown" (A. H. Hildick).....40 to 100 lb. 15c net
Solid, Peter Wright's.....15½
Solid, Wilkinson's.....13½
Parallel, Parker's.....dis 40
Saw Filers, Hopkins' ℔ doz $17.50, dis 10
Reading.....dis 45&10
Cowell Hand Vises.....dis 20
Richardson's Vise and Anvil.....dis 25

Augurs and Bits. Dis

C S cut augurs.....40&10
do do do bits.....40&10
D C gimlet do Ives....dis 50
Snells bits.....dis 40
Russell Jennings' augers dis 16⅔ &10&10
Cook's pat augur.....40&10

Animal Pokes.

Berea, per doz.....4 00
Eagle, per doz.....5 00

Apple Parers.

Domestic & Reading ℔ doz.$7 50
Turn Table.....4 00

Bolts.

Machine.....dis 60
Bolt ends.....dis 60
Plow.....dis 50
Plow, R. B. & W.....dis 40
Cast Iron Barrel Shutter, etc.....dis 50&10
Cast Iron Chain (Sargent' list).....dis 60&10
Ives' Pat. Door Bolts..dis 50
Wrought Barrel.....dis 55&10
Wrought Square.....dis 55&10
W'r'g't Shut'r, all iron, Stanley's list.....dis 50&10
Union Carriage.....dis 70
Tire, R. B. & W., new list.....dis 70&10
Stove, American Screw Co.'s.....dis 40

Bellows. Dis

Blacksmith's com new list, 45℔ct
Moulder's new list, dis 25 ℔ cent
Hand, new list, 25 per cent

Butts. Dis

Wrought brass.....65&10
Cast, loose joint.....10&10
Pin, japanned and silver tipped.....45&10
Wrought, fast joint narrow.....40&10
Wrought fast joint broad.....40&10
Wrought loose joint broad.....45&10
Wrought table and back flaps.....40&10
Loose joint, reversible.45&10

Cleveland Stamped Elbows

Genuine Russia Iron

4 inch per doz.....4 50
4½ do do.....5 50
5 do do.....7 50
5½ do do.....8 50
6 do do.....9 50
7 do do.....11 00

Planished American Russia Iron

4 inch, per doz.....4 00
4½ do do.....5 00
5 do do.....6 50
5½ do do.....7 50
6 do do.....8 50
7 do do.....9 50

Charcoal Iron

4 inch, per doz.....2 00
4½ do do.....2 50
5 do do.....3 50
5½ do do.....4 00
6 do do.....4 50
7 do do.....5 50
25 per cent

Chisels.

Hot and cold cutting.....℔ lb 30
Railroad track.....30
Machinists.....30
Mallet head.....50
Cape.....50
Packing.....50
Stone cutters.....50

Crowbars.

Cast steel.....℔ lb 8½
Iron, steel points.....6½c

Cutlery, Pocket and Table.

Meriden Cutlery Co, table..net
Am. Miller Bros.' Cutlery Co.....dis 25
Humason & Beckley, pocket 33⅓
Naugatuck Cutlery Co...list net
Aaron Berkenshaw's pocket dis 25

Crucibles.

Per number.....4@ 4½

Novelty Clothes Wringers

Keystone per doz.....42@45

Chains.

Coil by cask.

3-16	¼	5-16	⅜	7-16	½
10¾	9	8	7	6¼	6¼

Drills and Drill Stocks.

Blacksmiths', each...$2.50 dis 10
Blacksmiths', self-feeding, each 7.50 dis 20
Breast, P. S. & W.....dis 20&10

Drawing Knives.

Witherby's.....dis 65@10
Nobles Mfgr. Co.....15
Adjustable handle.....20

Emery.

Genuine Chester.....7@ 8
Wellington.....10@12

Files.

Auburn...$5 to £. dis 35 pr cent
E. M. Boynton's, new list dis 25
J. & Riley Carr.....4.50 to £.
Johnson & Bro.....dis 30
Butcher's.....4.50 to £.
Walter Spencer & Co.'s "Diamond".....4.50 to £.
Fisher's.....4.75 to £
Moss & Gamble.....4.50 to £.
H. Disston & Sons (new list).....dis 40 per cent
Heller Bros.' Horse Rasps dis 25
Nicholson.....dis 40
New American.....dis 40
Union File Co.....dis 40

Grindstones.

Ohio.....1¼@1½ ℔lb
Nova Scotia.....1¼@1½ ℔lb

Hatchets.

Yerkes & Plumb:--Shingling, Nos....1, 2, 3,
℔ doz $7 50, $8 00, $8 50, dis 25
Claw, Nos....1, 2, 3,
℔ doz $8 25, $8 75, $9 25, dis 25
Lathing, Nos....1, 2, 3,
℔ doz $7 50, $8 00, $8 50, dis 25

Horse Rasps.

Heller's.....dis per cent 30
"Arcade"... 50 & 20

Harrow Teeth.

Iron ⅝ to 1 inch.....per lb 3¾c
Steel, square.....4¾c

Hammers.

Mason's stone hammers, steel faced and pene.....℔ lb 18
Mason's stone hammers, solid cast steel.....23
B. S. Napping hammers 30
Striking hammers, solid cast steel, 5 to 25 lb.....18
Drilling hammers, solid cast steel, 3 to 6 lb.....18
Turning hammers, full polished.....each 2 00
Set hammers.....℔ lb 35
Creasing hammers.....35
Ordinary bush hammers 55

Nails.

10 to 60d.....3 40
8 and 9d.....25
6 and 7d.....50
4 and 5d.....75
3d.....1 50
2d.....2 75
3d fine.....3 00
2d fine.....3 75
⅜ inch.....3 00
4d barrel.....1 00
1¼ inch barrel nails.....1 50
1½ do do do.....1 75
1 do do do.....2 50
⅞ do do do.....3 00
Cut spikes, all sizes.....25
Clinch nails, all sizes.....1 75
Casing and box nails 75 cts advance
Finishing nails, $1 25 do
Tobacco nails, 50 cts do

Nuts and Washers

Nuts, square.....7c off list.
Nuts, hexagon.....7c. off list.
Washers.....6c off list.

Picks.

Railroad, 4 to 5 lbs...doz $7 75
5 to 6 lbs.... 7 75
to 7 lbs.... 8 50
7 to 8 lbs.... 9 50
Railroad Tamping Pick.... 7 to 8 lbs..doz 13 50
Mill Picks per lb.....75c

Rivets.

Iron.....dis 40
Tinned.....dis 40
Copper.....dis 33⅓

Squares. Dis

Steel or iron, case lots.....50
Try squares and T bevels.....40

Spikes—WROUGHT

All lengths by ¼ inch.....4¼c
do do do 5-16.....3½
do do do ⅜, 7-16 & ½in 3¼

Shovels and Spades.

Ames' new list, July 1, 1881.....dis 15
Old Colony.....dis 15
Remington's (Lowman's Patent).....dis 30
Rowland's.....dis 40 and 10
Griffiths.....dis 40&10

Saw Sets.

Boynton s patent X Cut, per doz $12; Hand Saw, per doz $10.....dis 20
Stillman's Genuine, per doz $3 50 and $5 50.....dis 20
Stillman's Imitation, per doz $3 25.....dis 20&10
Common Lever, per doz $2 dis 30&10
Leach's No. 0 $8; No. 1 $15; dis 15
Hammer, Hotchkiss $5 50, dis 10
" Bemis & Call Co.'s new patent.....dis 40&5
Bemis & Call Co.'s Lever and Spring Hammer..dis 30&5
Bemis & Call Co.'s Plate..dis 10
" " Cross-cut dis 12½
Aiken's Genuine...$13, dis 50&10
" Imitation.....$7, dis 50
Hart's Patent Lever.....dis 20
Disston's Circular.....dis 40

Sad Irons.

From 4 to 10 lbs....per lb 3¾ net
Self-Heating.....℔ doz $9 net
" Tailors..℔ doz $18 net
Gleason's Shield and Toilet.....dis 25
Mrs. Pott's Irons, double pointed.....dis 35
Mrs. Pott's Irons, square back.....dis 35
Enterprise Star Irons....dis 40
Combined Fluter and Sad Iron.....℔ doz $15, dis 15

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Planes.

Ohio Tool Co.....dis 20
Sciota.....dis 25
Bailey's Pat. Adjustable. dis 25

Rules.

Stanley.....dis 66⅔ and 10

Sash Locks. Discount.

Payson Mnfg. Co. "Perfect"..42
Simmons' Sash Supporters....20

Hinges.

Champion double acting spring hinges.....dis. 30
Screw & Strap 8@12 in.....$6. net
Gravity Locking Blind Hinges, Sargeant & Co. 70&10

Screws. Dis

Flat head iron or steel per cent dis.....30
Flat head brass.....30
Round head iron or steel..25
Round head brass.....20
Brass and Silver capped..40
Japanned, list of Plain Screws.....20
Coach, patent Gimlet point, list per 100.....60
Lag, taper points.....60
Bed.....10
Machine, flat head, iron..55
round head, iron 50
Bench, iron.....55&10
wood, beech, per doz $3.....10
wood, hickory.....20&10

Scales. Dis

Fairbanks'.....25

Tank Iron.

3-16, ¼ and ⅝ inch thick....3 20

Tacks. Dis

Black.....80—10
Tin'd.....50

Traps. Dis

New House.....30
Peck, Stow & Co.....50—10

Valves. Dis.

Jenkins' Patent Gate Valves..35
" " Globe " ..40
" Standard Packing " ..20

Wrenches.

Coe's genuine.....40 & 10
Coe's imitation wrought bar..60
Mechanics'.....60 and 10

Wire.

Brass and Copper.....dis 20
Bright & annealed, Nos. 0@18 dis 50@52½
" " Nos. 19@26 dis 60
" " Nos. 27@36 dis 65
Coppered.....Nos. 0@18, dis 45
Galvanized, Nos. 0@18, market list,.....dis 40@45
Tinned, Nos. 0@18,....dis 40@45
Cast steel.....dis 40
Tinned Broom Wire, Nos. 18@25.....dis 55
Annealed Fence, Nos. 8 and 9.....dis 55@52½
Annealed Grape, Nos. 10 to 14.....dis 52½
Galvanized Telegraph, Nos. 7 to 9.....℔ lb 7¼c
Galvanized Telegraph, Nos. 10 to 11.....℔ lb 8¼c
Galvanized Telegraph, No 12.....℔ lb 10¼c
Fence staples.....℔ lb 5½@5¾c
Fence Staples, galvanized, ℔ lb 7@7¼c
Stubs Steel Wire...$7 00 to £
Barb Wire, painted.....8¼c
Barb Wire, galvanized.....9¼c
Crucible Steel Ropes from ⅜ in. at 9c to 1½ in. at.....52c
Best Selected Iron Ropes from 3-16 in. at 3c. to 1¼ in. at.....33c

Boiler Plates.

("Gaylord"--Standard Quality.)
C. No. 1.....4 50
C. H. No. 1 Shell.....4 60
C. H. No. 1, 50,000.....5 00
C. H. No. 1, 55,000.....5 50
C. H. No. 1 Flange.....6 00
Firebox.....
T. S., 60,000.....(as per)..6 00
T. S., 65,000.....(act of)..
Homo. Steel, 70,000 (of Cong).8 00
Heads, ½c ℔ lb extra.
N.B.—Eastern brands of boiler plate at from 2-10 to 3-10c ℔ lb less than above prices.

Sheet and Tank Rivets. "Norway."

All sizes.....dis. 15

Boiler Rivets—"Albany."

½, ⅝, 11-16, and ¾ in. diam.5 50

Boiler Makers' Tools.

Doty's Power Shears....net list
" Hand Lever Shears.net list
" Power Punch.....net list
" Hand Punch.....net list
Steel Screw Punch.....net list
Iron Screw Punch.....net list
Boiler Plate Rolls.....net list
Buffalo Forges & Blowers dis 20
Watson's " " net list
Spring Tube Expander....dis 15
Roller Tube Expander...net list
National Tube Cleaner...dis 20
Wire Flue Brushes.....net list
Anvils—"Peter Wright" 12½℔ lb
Solid Box Vises.....net list

Nuts, Bolts, etc.

Square & Hex. Nuts....7 off list
Washers.....6 off list
Machine Bolts.....dis 55
Bolt Ends.....dis 55
Boiler Patch Bolts.....net list

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch.....dis 37½
"National" Standard Gauge 11 inch to 15 inch.....dis 25
"National" Special Locomotive Tubes.....net list

IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch..... 2 40
4½ to 6 by ⅜ to 1 inch..... 2 50
1¾ to 6 by 1⅛ to 1½ inch.... 2 80
1¼ & 1¾ by ⅜ to ¾..... 2 50
1 & 1¼ by ⅜ to ¾..... 2 60
⅝ ¾ and ⅞ by ⅜ to ¾..... 2 80

Round,

1 to 1¾ inch..... 2 40
2 to 2¾..... 2 60
2¾ to 3¼..... 2 90
3¾ to 4..... 3 40
4¼ to 4½..... 3 90
4¾ to 5..... 4 10

Square.

1 to 1¾ inch..... 2 40
2 to 2¾..... 2 60
2¾ to 3¼..... 2 90
3¾ to 4..... 3 40
¾ to ⅞..... 2 50

Heavy Band.

1¾ to 6 by ¼ and 5-16 inch. 2 60
1 to 1¾ by ¼ and 5-16 do 2 70
¾ to ⅞ by ¼ and 5-16 do 2 90
⅝ to ¾ by ¼ and 5-16 do 3 40

Half Oval and Half Round.

Wagon box iron ¾ and ⅞.. 4 00
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1¾ to 6 by ⅜ to 3-16..... 2 90

Hoops.

1¼ to 2 , Nos 16 to 18..... 3 30
1¼ to 4 do 18 to 15..... 3 20
1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24..... 4 30
No 25 to 26..... 4 50
No 27..... 4 70
No 28..... 5 10

English Steel.

Best cast.....℔ lb 15½c
Extra cast..... 16½c
Round machinery, cast 10c
Swaged, cast..... 18c
Best double shear..... 15½c
Blister, 1st quality.... 13c
Refined tool steel..... 16½c
Spring calking..... 7½@7¾c
German steel, best.... 11c
2d quality..... 10c
3d quality..... 9c
Sheet cast steel, 1st quality..... 15½c
2d quality..... 14½c
3d quality..... 12½c

American Steel.

Best brands of refined cast steel..... 12c
Crucible machinery.... 8c
Open-hearth ditto..... 5c
Hammer cast steel..... 9½c
Spring cast steel..... 7½c
Bessemer and open-hearth spring..... 5½c
Ditto plow..... 5¼c
Steel boiler plate..... 6½@7c
Bessemer machinery..5 @6c
Spring and calking.....7¼@7½c
Tire..... 5
Sleigh shoes..... 5

Bessemer Steel Tire.

¾ to 1 by 8-32..... 4½ ℔ lb
¾ to 1 by ½ to 5-32 ..... 4½ ℔ lb
¾ to 1 by 3-16 to ¼ ..... 4½ ℔ lb

Miscellaneous Cast Steel.

Auger and auger bit..... 8
Axle steel for wagons..... 8
Frog points and plates..... 9
Frog size bars..... 7½
Pick, plain..... 10
Mattock, beveled..... 9
Table cutlery..... 8½
Trap spring steel..... 9
Pike and cant hook..... 8½
Coal and granite..... 8½

TINNER'S STOCK.

Tin Plate,

10x14 IC charcoal.....$6 25
do IX do..... 8 25
12x12 IC do..... 6 00
do IX do..... 8 50
14x20 IC do..... 6 50
do IX do.....$6 25@7 50
DC, 12½x17 do..... 6 00
DX 12½x17 do..... 8 00
For each additional X add 2 00
IC 10x14} coke.....$5 75@5 50
IC 14x20}
IC 12x12 do.....5 00@5 75

Tin.

Banca.....per lb. 28c
Straits..... " 25c
English..... " 25c
Spot Tin..... " 25c

Solder.

½ and ½..... 16½c
Extra..... 15½c
No. 1..... 13½c

Pat Planished Sheet Iron.

[A].....per lb 10½c
[B]..... 9¾c

Nos	10	15	21	25
	to 14	20	24 & 26	
Com	3-60	3-80	4-00	4-20
Char	5-60	5-80	6-00	6-20

Sheets over 28 in. wide ¼c extra

Zinc.

Sheet, cask..... 7½@ 7¾
Sheet, open..... 8@ 8½

Tinners' Tools & Machines.

Machines (P. S. & W.) list add 20
Tools (P. S. & W.).....add 6

LEAD.

American, ℔ lb.....5¼@5¾c
Bar, ℔ lb..... 6¼c net
Pipe, ℔ lb 7¼c dis 10 per ct
Sheet, ℔ lb.. 8c dis 10 per ct
Tin-lined pipe ℔ lb 15c dis 10 pr ct
Shot Drop 7c; Buck.... 8c
Chilled Shot..... 8c

COPPER.

Lake Ingot..... 18¼c
Baltimore..... 17¼@18c
Arizona..... 18c

Sheathing Braziers Copper, Bolts, &c.

Brazier's Copper, ordinary sizes, 16 oz. per sq. foot, and over per lb.....30c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq foot, per lb. 32c
Brazier's Copper, 10 oz and 12 oz per sq ft. per lb. 34c
Brazier's Copper lighter than 10 oz per sq ft ..per lb 36c
Circles less than 84 inches in diameter ..per lb. 33c
Circles 84 inches in diameter and over.....per lb. 30c
Segment and Pattern sheets per lb. 33c
Locomotive Fire Box sheets per lb. 30c
Sheathing Copper, over 12 oz per sq. ft. ...per lb. 28c
Bolt Copper.....per lb. 30c
Copper Bottoms..per lb. 31@32c
No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

Tinning.

14x18.....per sheet 6c
All other size sheets, 2½c per square foot For tinning both sides, double the above amount.

SCRAP IRON AND OLD METAL

DEALER'S SELLING PRICES.

	Net Tons.
No. 1 wrought scrap.....	$24
Sheet and hoop "	10@11
Cast scrap, (No. 1 heavy).	19
Cast Scrap (Stove Plate).	12

OLD METALS.

Old copper per lb.....	15c
No. 1 H. Brass per lb.....	14
Heavy yellow Brass do.....	12
Light Brass per lb.....	12
Scrap Zinc per lb.....	6
Tea Lead per lb.....	3
Heavy Lead per lb.....	4

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Brass.

All Nos not thinner than to No. 28, wider than 2 in. not wider than 14 inch.....30c
All Nos. to No. 28, inclusive, and widths over 14 to 20 in. inclusive.....35c
All Nos. to No 28, inclusive, and widths over 20 to 30 in. inclusive.....38c
½c per lb. advance on each No above Nos. 28 to 38, inclusive.
All Brass thinner than No. 8 is Platers' Brass at.....53c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches .37c

Low Brass.

4c per lb. more than High Brass.
Gilding metal 8c per lb. more than High Brass.

Platers' or Gold Metal

In Bars.....	48c
Sawed.....	51c
Planed or Polished...	54c

For Slitting.

Metal in width in. to ½ in. to No. 28, inclusive, 1c per lb advance.
Metal, in width 2 in. to 1 in., thinner than No. 28, 2c per lb. advance.
Metal, in width ½ in. to ¼ in. thinner than No. 28, 5c per lb. advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths, add 7c per pound.

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas Pipe.

Inside Diameter. Inches.	Plain, Price Per Foot.	Galvan. or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛..	08		.40	.24
¼..	08	$0 11	.54	.42
⅜..	09	12	.67	.56
½..	11	15	.84	.85
¾..	13½	19	1.05	1.13
1 ..	19	28	1.31	1.67
1¼..	27	40	1.66	2.26
1½..	33	47	1.90	2.69
2 ..	46	64	2.37	3.66
2½..	75	1 00	2.87	5.77
3 ..	95	1 30	3.50	7.55
3½..	1 25	1 70	4 00	9.05
4 ..	1 50	2 05	4.50	10.73
4½..	1 75	2 40	5.00	12.49
5 ..	2 25	3 00	5.56	14.56
6 ..	2 75	4 00	6.62	18.76
7 ..	3 75	....	7.62	23.00
8 ..	4 75	....	8.62	28.00
9 ..	6 50	....	9 68	34.40
10 ..	8 00	....	10.75	40.64
12 ..	12 00	....		54.65

Discount, plain, 55 per cent; galvanized, 52½ per cent.

Gas and Steam Fitters' and Machinists' Supplies.

Gas and Steam Pipe—See Pipe Wrought.
Enameled Pipe.....dis 65
Artesian Well Casing....net list
Hydraulic Tubes.....net list
Malleable Iron Fittings..net list
Cast Iron Fittings.....dis. 55
Globe Valves.....dis. 50
Angle Valves.....dis. 45
Check Valves.....dis. 45
Safety Valves.....dis. 45
Eddy Gate Valves.....dis. 20
Steam Cocks.....dis. 45
Service Cocks.....dis. 45
Ball Gauge Cocks (net per dozen).....$15
Compression Gauge Cocks dis. 45
Miss. Gauge Cocks.....dis. 45
Register Gauge Cocks (net per dozen).....$15
Cylinder Cocks.....dis. 45
Air Cocks (net per dozen)..$2 75
Oil Cups.....dis. 45
Steam Gauges.....dis. 35
Water Gauges.....dis. 45
Scotch Glass Tubes.....dis. 60
Steam Whistles.....dis. 45
Iron Body Globe Valves..dis. 55
Iron Body Safety Valves..dis. 55
Iron Body Steam Cocks..dis 55
Pipe Tools.....special
Globe, Angle and Check Valves (Powell's regrinding).....dis. 45
Guarantee "Jet Pumps" dis 40
Mack's Injectors.....dis. 25

Babbitt Metal.

N. P. U.....℔ lb @9c
A. 28c., B. 25c., C. 15c.

COAL,

WHOLESALE.

Wholesale f.o.b vessel at Cleveland:

Carbon Hill and Monday Creek.....$2 65
Massillon.....2 85
Brier Hill.....3 50@3 75
Pittsburgh.....3 00
Salineville.....2 50
Tuscarawas.....2 25

RETAIL.—Delivered.

Massillon Lump.....$4 00
" Nut.....3 75
Carbon Hill and Monday Creek, lump.....3 75
Carbon Hill and Monday Creek, nut.....3 50
75c less on cars by car load.
Anthracite Stove and Chestnut.....7 15
Egg and grate.....6 00

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15.....	7 50
11x14 to 15x24.....	8 50
16x24 to 20x28.....	9 75
15x34 to 24x30.....	10 75
26x28 to 24x36.....	11 50
26x36 to 26x44.....	13
26x46 to 30x50.....	14 00

DOUBLE THICKNESS

6x8 to 10x15.....	11 7
11x14 to 15x24.....	13 25
16x24 to 20x28.....	15 75
15x34 to 24x30.....	17 25
26x28 to 24x36.....	18 50
26x36 to 26x44.....	21 25
30x50.....	22 50
30x52 to 30x54.....	23 25
30x56 to 34x56.....	25 00
34x58 to 34x60.....	27 75
36x60 to 40x60.....	30 00

Dis 60 & 15 single, 60 & 20 double

OILS.

Pure Oils. packages included

Sperm, winter bleached per gal.....	1 18@1 20
Whale, winter bleached per gal.....	65@
Seal, winter bleached	80@ 85
Straits.....	50@ 53
"A" oil for tanner's use	35@ 40
Lard oil extra W S....	1 08
do No 1 do.....	85
do No 2 do.....	70
Tallow oil.....	65@ 72
Neatsfoot oil pure....	1 05
do No 1.....	90
Linseed oil, raw.....	57
do do boiled.....	60
do do Extra Lake Erie	90
do do No 1.....	85
do do No 2.....	70
Cotton seed oil white..	64@ 66
do do yellow	60@ 63
Carbon oil Ohio legal test.....	9¼@11¼
West Virginia lubricating 28 deg.....	@ 29
Pure Mecca.....	55@ 50
Paraffine oil winter pressed.....	25@ 30
Machinery.....	40
Engine.....	50
Miners' oil.....	40@45
Drilling oil.....	40

Hides and Leather.

Prime cured hides, 7¾
Green hides 6@6¼
Bull, scrubby, badly scored or damaged, cured, two-thirds price.
Prime dry hides..... 13@14
Horse hides, green $1 75@2 00
Horse hides, dry.....$2 00@2 25
Prime cured veal calf. 12¼
Prime Deacon Skins, salted 65@70
Pelts, wool on.. 32@34
Fresh slaughter sheep 90@$1 50
Fresh slaughter lambs 50@60
Green calf skins..... 13
Hemlock rough..... 23@24
Oak harness..... 34@38
Oak sole..... 37@40
Union harness..... 31@34

Cleveland Business Directory.

Assayers and Analytical Chemists.

JUDSON, W. E, Ana ytical Chemist, 8 Cushing Block.

Bolt and Nut Works.

HOTCHKISS & GAYLORD, manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws.

Boiler Makers.

SMITH & TEACHOUT—(Established 1857.) Boiler, Tanks, Stills etc. 429 Broadway.

Bridge Builders.

BUCKEYE BRIDGE AND BOILER WORKS mfrs of Arch & Truss Bridges, Boiler Tanks and Oil Stills Bet. Wasson St. and Case Ave.

Coal and Iron Exchange.

JACKSON IRON CO. Iron Ore and Pig Iron. Rooms 8 and 9. Fayette Brown, Gen. Agent.

RHODES & CO. Coal, Iron Ore an Pig Iron. Rooms 1 and 2.

Carriage Blacksmith.

STRIEBEL, CHAS. manfac'r. of Carriages and Wagons and platform trucks. Horse shoeing and general blacksmithing .93 Woodland ave.

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts.

Church and School Furnture.

FAULHABER, GEO. manufacturer of School and Church Furniture. Fine Hard Wood work a specialty. 203 Ontario Street.

Custom Boots and Shoes.

ROONEY, JOHN manufacturer of hand-made Boots & Shoes, custom made and warranted 177 Ontario Street.

Carriage Repository.

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection.

SLATER, G. A., Carriage dealer, sells the best work for the lowest price. A fine assortment always on hand. Repository 365 Euclid Avenue.

Coal and Pig Iron.

ANDREWS, HITCHCOCK & CO., Briar Hill Coal and Pig Iron. 122 Water Street.

Electrical,

ELECTRIC SUPPLY CO. manfrs and dealers in Electric Burglar Alarms, Annunciators, Cell Bells and Batteries. Telephone lines built and repaired. 145 Seneca Street.

Fresco Artists.

KEMMER & KUSHMAN DECORATIVE CO., Fresco Artists, Fine Modern Wall Papers. 398 Euclid ave.

Foundries.

BOWLER & CO., Car Wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

CLEVELAND MALLEABLE IRON CO., manufacturers Malleable Iron Castins.

LAKE SHORE FOUNDRY, Water and Gas Pipe, Light and Heavy Castings. Alabama st.

TAYLOR & BOGGIS, successors to H. & H. F. Taylor, Iron Founders, 65 to 73 Central Way.

VIADUCT FOUNDRY COM'Y, Aenis, Carlin & Strangward manfrs of Machinery Castings Fine Light Castings a Specialty. Office & Works 11 13 15 and 17 Detroit Strert, near Center.

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a Specialty. No. 435 Broadway.

File and Saw Works.

PARKIN, W. H & CO., Hand-cut Files and Rasps, dealers in Disston's saws, 11 So. Water

Flue Cleaner.

CLEVELAND FLUE CLEANER M'F'G. CO. manufacturer of Aitchison & Doolittle's Patent Steam Flue Cleaner, 22 & 24 Power Block.

Hotels.

FOREST CITY HOUSE, cor. Public Square and Superior st., Terrill & Ingersoll, Props.

KENNARD HOUSE, D. McClasky, Prop.

NEW ENGLAND HOTEL, Water st., W. W. Wolcott, Prop. Refitted and refurnished.

STRIEBINGER HOUSE, between Ontario and Seneca sts. $2.00 per day. Hawley & Langton

CITY HOTEL, Seneca street. H. B. West, proprietor. $1.50 per day.

Hides, Pelts and Leather.

DENNISON BROS., dealers in Hides, Pelts, Furs and Tallow, 48 and 50 River street.

Hardwood Lumber.

MARTIN, J. T. dealer in Hardwood Lumber, Stone's Levee, near Central Way.

Lumber.

WOODS, PERRY & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter st.

FISHER, WILSON & CO., wholesale lumber dealers (pine & hard wood), rough and dressed umber, timber, lath shingles, etc. 47 Central Way

KRAUSE, C. A., & SON, wholesale and retail dealers in lumber. Yards cor. Superior and Wason and 281 Merwin streets.

Cleveland Business Directory.

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water street.

CLEVELAND ROLLING MILL CO., manuf'rs. of Steel and Iron Wire and Steel Tire.

WORTHINGTON, GEO. & CO., Hardware and Dealers in Metals, Water street.

Lime Manufacturers.

RUSSELL LIME CO., manufacturers of White Lime; also dealers in Plaster, Cement, etc. 85 Elm street.

Machinery and Boilers.

CLEVELAND STEAM FURNACE CO., Engines and Boilers, cor. Detroit and Center sts.

KRITCH, K. E. Metal Pattern Maker. Small machinery repaired. Lawn Mower sharpening a specialty. 42 South Water Street.

Machinery Depot.

CLEVELAND MACHINERY DEPOT. (now National Machinery Depot.) The largest stock of New and Second-hand Engines, Boilers and Machinists' Tools. Shop and Warehouse corner Bond and Superior streets.

Mercantile Agency.

THE MERCANTILE AGENCY. R. G. Dun & Co. proprietors. 121 Superior street.

Oil Manufacturers.

AMERICAN LUBRICATING OIL CO., manufacturers of lubricating oils. 23 Euclid ave.

Paints and Oils.

MASTERS, J. N. jobber in Paints, Oils, Varnishes. Brushes, 34 Prospect st.

Pattern and Model Makers.

WHITTINGHAM, J. & C., Metal Pattern and Model makers 52 Canal Street.

STAIR BUILDER.

PFEIL, CHAS, Stair Builder; Hard Wood Mantles and Office Railing. Works, 49 & 51 Canal street, Cleveland, Ohio

JOHNSON & PURSER, Stair Builders and manuf'rs of Mantels, Odd Pieces of Furniture, &c. 30 West street, up stairs.

Steel Stamps and Stencils.

FLEHARTY, J. H. & CO., Rubber Stamps, Seals, Stencils. 197 Superior street.

Tanners.

GAENSSLEN BROS., Tanners, and dealers in leather, oil and shoe findings. 80 Water-st.

Trunks and Valices.

FABER, J. manuf. Trunk, Traveling Bags and Ladies' Fine Satchels. Sample Trunks and Cases a Specialty. 58 Public Square.

Vessel Agents.

WEBB, H. J. & CO., Ship Brokers and Vessel agents. 17 & 18 Board of Trade Building. 122 Water Street.

Wood Carving.

HERKOMMER, J., Carver and Ornamenter in Composition. 225 Erie street.

Business Directory.

Akron, O,

AKRON IRON CO., manufacture best Common, Refined and Charcoal Iron.

CASCADE HOUSE, cor. Mill ard Summit sts., near Depot. J. Downie, Prop.

MCNEIL, J. C., Steam Boilers, Heavy Sheet Iron Work. Repairing promptly executed.

PERKINS, C. E., dealer in Agricultural Implements, machinery, and Manufacturers' Ag'nt

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc.

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street.

Alliance, O.

ARLINGTON HOUSE, cor. Main and Liberty Streets. Centrally located. Sample Room for Commercial Travellers. H. S. Adams, proprietor

MCFARLAND, J. W. Engine and Machine Builder, and General Machine Jobbing

Columbus, O.

PAT. ADJUSTABLE WINDOW CURTAIN Cornice, manufactured by Strader's Curtain Cornice Works.

ROYCE & PULLING manufrs of Patent Steam Pumps for all purposes. Store room 30 High street. Works Nos. 5 and 7 Scioto street.

U. S. CARRIAGE CO. builders of fine Carriages, Buggies and Phætons. Salesrooms and Office 257, 259 and 261 Fourth street.

COLUMBUS MACHINE CO. manfrs. of Blowing, Stationary and Portable Engines, Brass and Iron Castings. West End Nat. Road Bridge.

REYNOLDS BROS., manufacturers of hand-cut Files and Rasps. Old files re-cut. Send for Price List.

CITY BOILER WORKS, manfrs of Stationary, Portable and Locomotive Steam Boilers. All work warranted Borger Bros. & Co.

MURRAY, HAYDEN & CO., manfrs of Malleable Iron. Cor. Randolph & West streets.

Business Directory.

Canton, O.

DIEBOLD SAFE & LOCK CO., manuf'rs. Safes. Locks, Bank and Safe Deposit Works.

NOVELTY IRON WORKS, Mill work, Shafting, engines, Imperial job printing press, etc

NEW AMERICAN HOUSE. Canton, Fred. Hipp, Prop.

EBERSOLE & KAILEY, Machine and Jobbing Shops. Gearing for Patterns or Machinery a specialty. Models of all kinds made & repaired.

Cuyahoga Falls, O.

THOMAS BROTHERS, manfrs of Ohio Stone Ware, Cuyahoga Falls Stone Ware Factory, cor Main and Broad streets.

TURNER, VAUGHN & TAYLOR, manufacture engines, presses and grinding machinery for clay; also paper, chain, wire and flour mill machinery. Send for Circulars and price list.

SNYDER, H. wholesale manufacturer of Sash, Doors, Blinds, &c. Send for Price Lists.

THE CUYAHOGA FORGE AND IRON CO., manfrs. of every description Car, Truck and Driving Axles, Forging, Shafting &c.

Canal Dover, O.

HECKMAN, E., manufr. and dealer in harness leather, upper, kipp and calf. Also, manufacturer & dealer in prime English Dairy cheese. Highest market cash price paid for hides.

Garrettsville, O.

UDALL & NILES Foundry and Machine Shop. General repairing and jobbing on short notice

Geneva, O.

THE ENTERPRISE MACHINE CO., L. L. Crane, Pres't, manfrs of Machinists' Tools and Machinery. Gear Cutting a specialty.

Lima, O.

LIMA HOUSE, centrally located; telegraph office in the house. J. Goldsmith, Prop.

Massillon, O.

CITY CARRIAGE WORKS, P. H. Young, prop. manfact'r of Carriages, Phætons and Spring Wagons. Work warranted. Cor. Tremont & Erie.

Painesville, O.

NORTH AMERICAN CUTLERY CO., m'fr's of Steel Shears and Scissors—best quality.

Ravenna, O.

THOMPSON, T. F., dealer in Agricultural Implements, farm machinery, hardware, seeds, fertilizers, &c. Cor. Main and Prospect sts.

BALDWIN, D. L. & SON, Contractors & Builders and manfrs of all kinds of Moulding, flooring, siding, &c. Rip, Band and Scroll Sawing.

Steubenville, O.

DORRANCE, D. W., Tool Works, manufacturer of hand-made miners' and stone-cutters' Tools Promp attention given to mail orders.

Sandusky, O.

SANDUSKY WHEEL CO. manfrs. of Sarven Patent Wheels, Carriage Bodies and Seats, Plain Wood Hub Wheels, Banded Hub Wheels, Jacobs' Patent Neck Yokes.

FULTON MACHINE WORKS & FOUNDRY, Barney & Kirby, proprietors, manfrs. of Stationary and Portable Engines and Boilers, Rolling Mill Machinery, Circular Saw Mills, etc.

Toledo, O.

BAKER, HERBERT, Machine Shop and Iron Foundry. 98 and 100 Erie street.

TOLEDO FOUNDRY AND MACHINE CO. builders of Steam Engines, Circular Saw Mills and all kinds machinery. Water St., cor. Cherry

RUSSELL IRON WORKS, mnfrs. of Architectural Iron Work, castings, pulleys, shafting and steam bending machinery. Cor. Water and Lagrange streets.

STANDARD SAW WORKS, H. Bartley, manufacturer and dealer in Saws of every description All kinds of Springs made from Sheet Steel. Reaper, Hay Knives Truss Springs, &c. made to order. 92 St. Clair Street.

UNION Wooden Ware Manufacturing Co. manufacture Sewing machines, washboards, children's wagons, carts, wheelbarrows, sleds, kitchen wooden ware, &c.

HEPBURN BROTHERS, proprie. Union Boat Works. Boats of all kinds made to order. For sale or rent. Water Street foot of Cherry.

Youngstown, O.

BELL, EDWIN & SON, manuf. of Nail Kegs, Pat. coiled hoops, slack barrel and keg heading and oil barrel stock.

INGLEDY, G. H. dealer in rough and dressed Lumber, Shingles and Lath.

MORTON HOUSE, formerly Maitland House, James Morton, Prop.

TOD HOUSE, cor. Diamond and Market streets. Henkel & Bowman, Props.

Zanesville, O.

KIRK HOUSE, William Kirk, proprietor. $1.50 per day.

Titusville, Pa.

FOSTER & MCKAY, dealers in boilers and engines, tubing, casing, old iron, rope, and all kinds of metals. Washington street, nr. Railroad.

Rochester, Pa,

OLIVE STOVE WORKS. (limited) manufacturers of Stoves and Hollow Ware.

Business Directory.

Erie, Pa.

ERIE STEAM BENDING WORKS. H. G. Fink, prop'r, manufacturer of Bent Felloes, poles, snafts, bob runners, etc. Cor. 12th & Cherry.

GUNNISON, A. B., wholesale manufacturer of Wood Pumps. 233 East Twenty-Second St.

BALL ENGINE CO., limited, manufacturers of Automatic Engines of 15 to 80 horse power

NOBLE SEWING MACHINE CO. manfrs of the New Noble Sewing Machine. Send for circulars and prices.

A. B. FEYGEMAKER & CO. Church Organ builders. Descriptive catalogue furnished on application.

Meadville, Pa.

CURRY & CO. general jobbers in Castings of al kinds.

Oil City, Pa.

REID, JOS. Machini t, steam engine and pump repairing. Brass and iron castings, light and heavy, made on short notice.

Sandy Lake, Pa.

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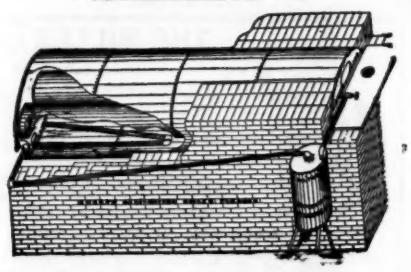

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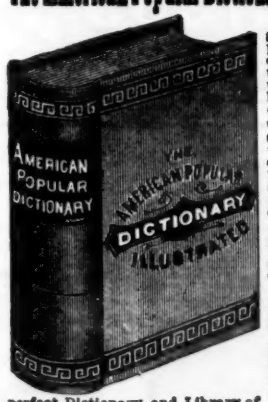

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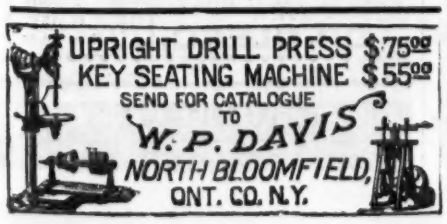

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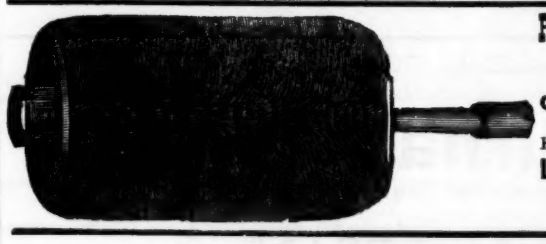

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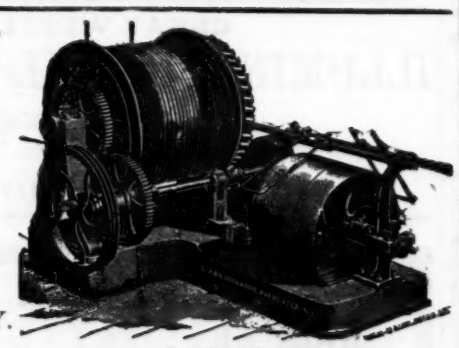

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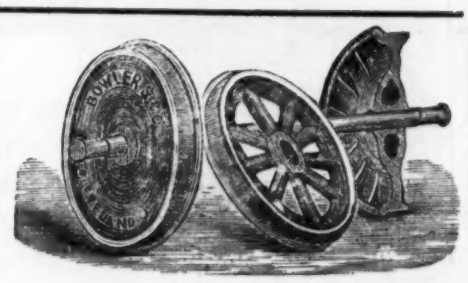

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TRAVELERS' REGISTER.

Lake Shore & Michigan Southern.

Trains marked with a * are the only trains that arrive and depart in this city on Sundays.

EAST BOUND TRAINS.

	Arrive.	Depart.
No. 20 Limited Express	*1:35 A.M	*1.50 A.M
No. 6 Atlantic Express	*7:05	*7.30
No. 10 Buffalo Accom	11:00	11.15
No. 8 C. & St. L. Exp	*2:25 P.M	*2.55 P.M
No. 4 Special N. Y. Exp	10:10	10.35
No. 2 San. Div. Accom.	10:12	
No. 12 Conneaut Accom.		4.50
Nottigham Accommodation (Sundays only)	10.05 A.M 4.45 P.M	9.00 A.M 2.15 P.M
No. 18 Elyria Accom	8.50 A.M	

WEST BOUND TRAINS.

	Arrive.	Depart.
No. 13 Mich. Accom		6.40 A.M
No. 1 Special Chicago Ex.	*6 35 A.M	7.00
No. 3 Toledo Express	1.25 P.M	3.30 P.M
No. 21 St. Louis Express	*1.40	*2.05
No. 5 Pacific Express	*7.05	*7.35
No. 11 Conneaut Accom.	8.40 A.M	
No. 19 Pt. Clinton Accom.		5.00
No. 7 Michigan Exp.	*2.50 A.M	*3.05 A.M
No. 17 N.Y. & Chi. Ex.	11.43 P.M	11.53 P.M

Cleveland, Columbus, Cincinnati & Indianapolis.

ARRIVALS.

No. 2 Col. & Cin. & Ind'pons Ex.	*7 10 A.M
No. 8 C. T.V. & W. & Clev Accom	10 30
No. 12 St. Louis & New York Exp.	*3 00 P.M
No. 4 Special Cin. & New York Exp	*3 40
No. 10 Wheeling & Cleveland Exp	8 30
No. 6 Indianapolis & Columbus Exp.	10 20

DEPARTURES.

No. 1 Cincinnati & Columbus Exp.	8 00 A.M
No. 11 Cleve, Indianap. & Wheel'g Ex.	7 10
No. 3 St. Louis & Cincinnati Ex.	†2 00 P.M
No. 5 Night Express	*7 25
No. 7 C T.V. & W. & Col. Accom	4 00

†This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland, Tuscarawas Valley & Wheeling.

ARRIVALS.

No. 4 Wheeling & Cleve'd Exp	7 15 P M
No. 2 Uhrichsville Accom	10 30 A.M

DEPARTURES.

No. 1 Wheeling & Cleve'd Exp	7 10 A.M
No. 3 Uhrichsville Accom	4 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.

No. 7 Mahoning Valley Accommo.	10 55 A M
No. 3 New York Express,	*7 00 P M
No. 1 New York Express,	6 50 A.M
No. 3 Pittsburgh Express,	*7 00 P.M
No. 5 Pittsburgh Express,	3 10
New York Express	3 10
No. 9 Youngstown and Pitts. Local	10 15

DEPARTURES.

No. 12 New York Express,	*7 10 A.M
No. 4 Youngstown Local,	11 15
No. 8 Mahoning Accommodation,	4 25 P.M
No. 2 New York Express,	10 45
No. 12 Pittsburgh Express,	*7 10 A.M
No. 6 Pittsburgh & Main Line Express	2 30 P.M

Cleveland & Pittsburgh.

DEPARTURES.	ARRIVE.
Mail 8 00 A.M	1 15 P.M
Express 1 25 P.M	7 30
Alliance Accommodation 3 45	10 10 A.M
Ravenna Accommodation 5 35	8 35
Night Express †11 40 P.M	6 30 A.M

† Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

ARRIVE.	DEPARTURES.
No. 2 Accom. 10 15 A.M	No. 1 Mail 8 15 A.M
No. 6 Express 1 35 P.M	No. 3 Accom. 2 20 P.M
No. 4 Mail 6 30 P.M	No. 5 Exp. 6 05

Trains leave from Depot foot of South Water Street.

Special trains leave on Sunday at 8.30 A. M. and 4.20 P. M., arriving at Cleveland at 10 A. M. and 6.25 P. M.

Connotton Valley Railway.

Arrive.	Depart.
No. 1 10 05 A.M	No. 4 4 00 P.M
No. 3 7 15 P.M	No. 2 8 10 A.M

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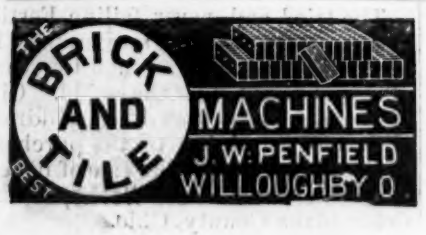

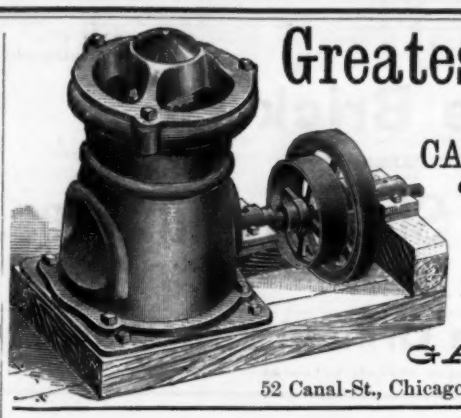

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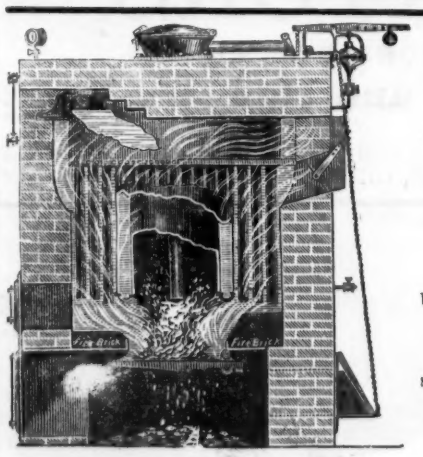

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Trains North leave Millersburg 7:50 a. m., arrive at Hudson 10:30 a. m., and return at 4:30 p.m

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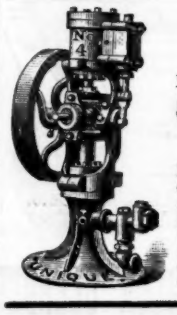

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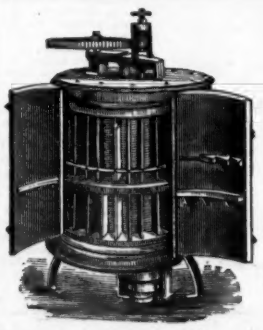

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VIA THE

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Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7:10A.M. LIGHTNING EXPRESS, (daily,) sleeping and hotel coaches from Leavittsburg. 8:55 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p.m.; Buffalo, 6:15 p.m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p.m., (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

10:45 P.M. NIGHT EXPRESS, (daily ex cept Sunday), Sleeping Coach from Leavittsburg to New York without change. Arrives at Youngstown 1:45 a.m.; Meadville, 3:50 a.m.; Corry, 5:30 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a.m.; Rochester, 1:10 p.m.; Hornellsville, 11:20 a.m.; Corning, 12:53 p.m.; Elmira, 1:21 p.m.; Binghampton, 2:50 p.m.; New York, 9:25 p.m.

2:30 P.M. PITTSBURGH EXPRESS,—daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 8:25 p.m; Washington, 7:30 a.m.; Baltimore, 8:15 a.m; via Sharon and Sharpsville to Meadville 7:40 p.m

4:25 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:30 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p.m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m.

7:10 A.M. PITTSBURGH EXPRESS,—(daily) through without change. Arrives at Youngstown, 10:00 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a.m.; Pittsburgh, 1:08 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:55 a.m., and 1:13 p.m. and 4:20 p.m.

11:15 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 2:10 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:50 a.m., 10:55 a.m. 3:10, p.m. 7:00 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

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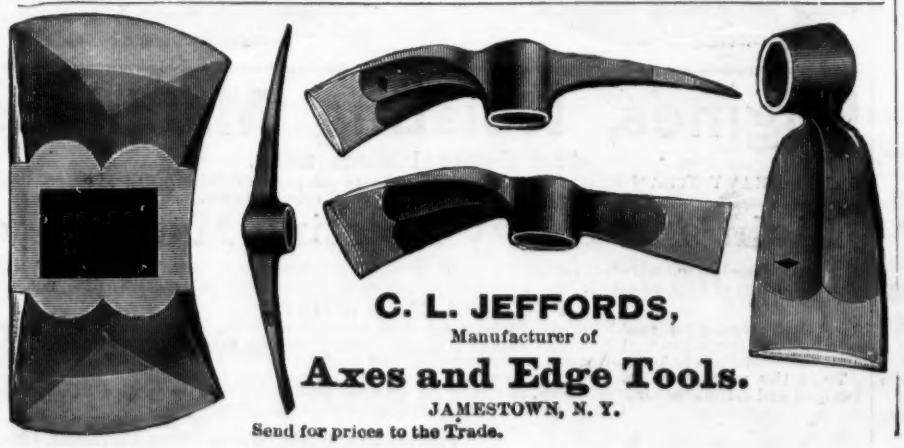

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Send for prices to the Trade.

CLEVELAND & PITTSBURGH RAILROAD.

Condensed Time Table of Passenger Trains, corrected to May 14, 1882.

MAIN LINE—GOING WEST.

	Day Expr'ss.	Mail Expr'ss.	Fast Line.	Accom
Leave Pittsburgh	7 30 a.m.	2 00 pm	11 50 pm	.....
Allegheny	7 40	2 10	12 00 am	.....
Arrive Rochester	8 23	3 00	12 50	.....
Beaver	8 30	3 05	12 55	.....
E. Liverpool.	9 08	3 37	1 37	.....
Wellsville	9 18	3 47	1 50	.....
Salineville	9 57	4 31	2 33	.....
Bayard	10 34	5 07	3 21	.....
Alliance	11 05	5 30	3 55 am	.....
Leave Alliance	11 10	5 30	4 05	7 30 am
Arrive Ravenna	11 48	6 04	4 47	8 15
Hudson	12 13 p.m.	6 28	5 15	8 50
Cleveland	1 15 p.m.	7 30 pm	6 30 am	10 10 am

Accommodation train leaves Ravenna at 6.45 a. m., arrives Hudson 7.15 a.m., Cleveland 8.35 a.m.
☞ Fast Line and Western Express run Thro' Sleeping Car, Pittsburgh to Cleveland.
NOTE.—Fast Line leaves Pittsburgh Sunday nights, but not on Saturday nights.

MAIN LINE—GOING EAST.

	Pittsb'g Expr'ss.	Fast Line.	Day Expr'ss.	Accom.
Leave Cleveland	8 00 am	1 45 pm	11 40 pm	3 45 pm
Arrive Hudson	9 05	2 43	12 50 am	4 50
Ravenna	9 37	3 08	1 18	5 20
Alliance	10 20	3 40	2 05	6 05 pm
Bayard	10 54	4 03	2 49	.....
Salineville	11 40	4 37	3 40	.....
Wellsville.	12 20 pm	5 14	4 35	.....
E. Liverpool.	12 54	5 44	4 57	.....
Beaver	1 30	6 17	5 47	.....
Rochester	1 35	6 22	5 52	.....
Allegheny	2 30	7 05	6 45 am	.....
Pittsburgh.	2 40	7 15	6 55	.....
Harrisburg.	.....	3 50 am	4 00 pm	.....
Baltimore	.....	7 30	7 20	.....
Washington	.....	9 02	8 47	.....
Philadelphia	.....	7 20	7 35	.....
New York	.....	10 25	10 35	.....
Boston,	.....	8 00 pm	.....	.....

Accommodation train leaves Cleveland Union Depot at 5.35 p.m., arrives Hudson 6.55 p.m., Ravenna 7 23 p.m.

All trains connect at Yellow Creek for Wheeling and Bellaire.
☞ Fast Line runs Through Sleeper to New York. Day Express runs Through Sleeper to Pittsburgh.

TUSCARAWAS BRANCH.

Trains leave Bayard at 11.00 a.m. and 5.10 p.m. arrive Minerva 11.08 p.m and 5 20 p.m : arrive Dover 12.18 p.m. and 7.15 p.m., New Philadelphia 12.30 p.m. and 7.30 p m. Returning leave New Philadelphia at 7.00 a. m. and 2.05 p. m., Dover at 7.30 a.m. and 2.15 p m., Minerva at 9 45 a.m. and 3.23 p. m., arrive Bayard at 10.00 a.m. and 3.33 p.m.

All trains daily except Sunday.

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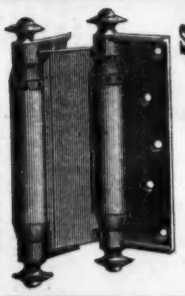
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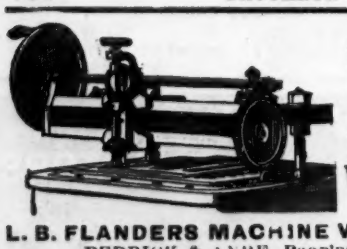
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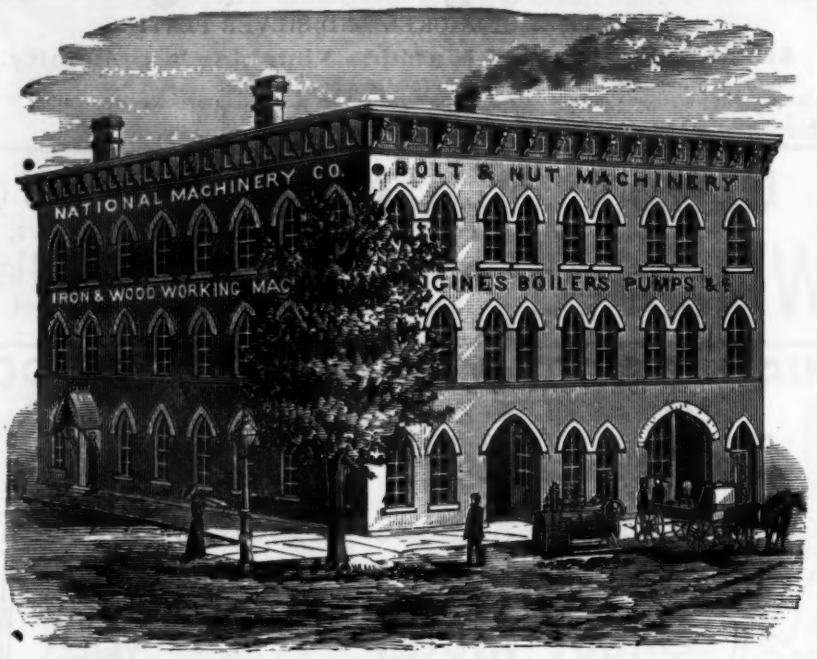

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One " " 22 inch Greenwood Heading Planer, $125
One " " Ellis Blind Slat Tenoner.
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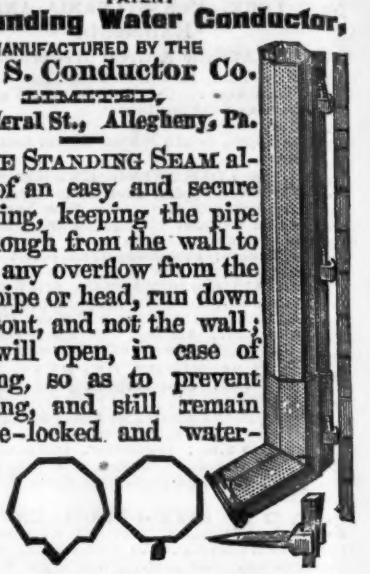

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